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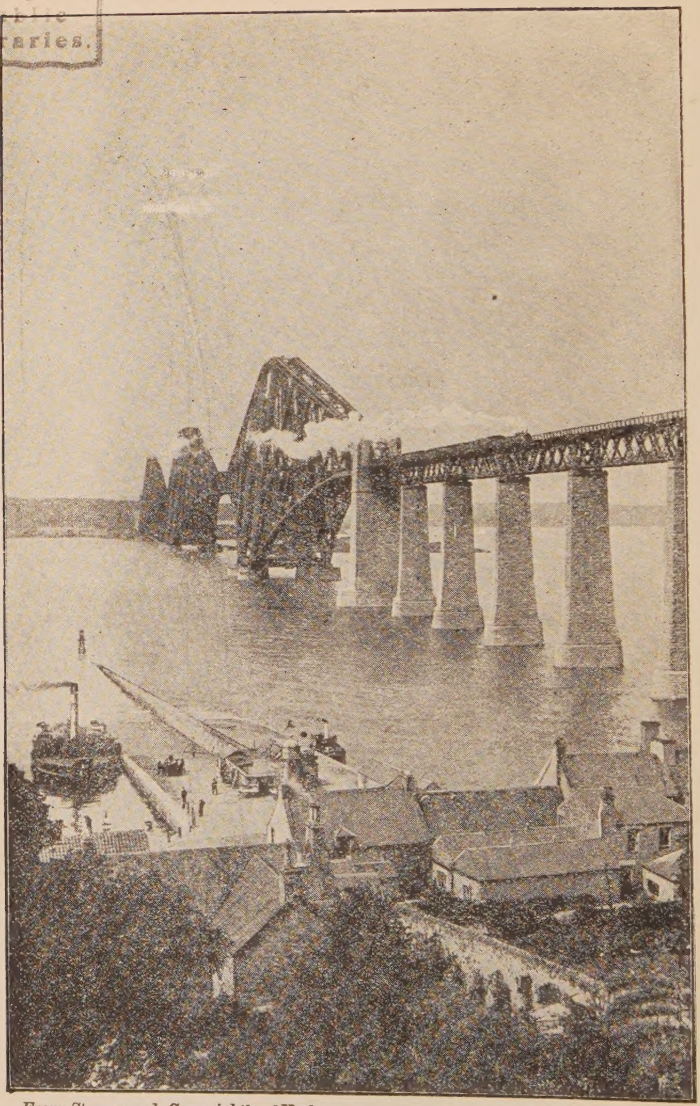

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FIG. 1.—THE FORTH BRIDGE.

942

OUR OWN ISLANDS

An Elementary Study in Geography

BY

THE RT. HON. SIR HALFORD MACKINDER

LATELY PROFESSOR OF GEOGRAPHY IN THE UNIVERSITY OF LONDON, AND FORMERLY READER IN GEOGRAPHY IN THE UNIVERSITY OF OXFORD

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PREFACE TO THE ELEVENTH EDITION

In this little book an attempt is made to teach some geography to children, with a human meaning in each chapter, and no unnecessary names. I do not pretend to begin at the beginning, for the first steps must be trodden with the help of the living teacher alone. Along what path those steps should be guided I have discussed in the book for Teachers which is companion to this series.

Nor have I tried to make each sentence evident, and to remove all difficulties, for I have assumed that the teacher will supply illustrations according to the locality of his school, and as the knowledge and aptitude of his pupils may require. My object has been to stimulate and lead oral instruction, not to supplant it.

Above all it is necessary that every paragraph should be *realized* upon the map, for the essence of good geography is that it should be accurately imaginative. If the successive steps be taken in logical order, and with some patience, children may acquire, comparatively early, a surprising command of the meaning even of a contoured map, and delight in reading it. But the first

stages must be carefully traversed, and therefore in the earlier of these chapters a central part of Britain is slowly described, but afterwards, when the map habit of thought has been won, a large area of the country is covered more rapidly. The North of England has been chosen for the purpose of commencement, not only because it is central in the British Isles, but also for its large and simple, yet emphatic topography. The neighbourhood of London is less suitable for the purpose, though London teachers will of course use local topography in the stage of "Home" Geography which should precede the aid of a text book.

Exercises upon the map are proposed in almost every chapter, and these must on no account be omitted, but rather multiplied as time and local circumstance may permit and suggest, for the activity and the imagination of a child are interlocked. Moreover, flexible accuracy of method is thus cultivated, not the rigid accuracy—less desirable—of quotation.

No picture has been inserted for a merely decorative end, and the pupil should be led to question each view, as well as diagram, to ascertain the contribution intended to the meaning of the letterpress.

Designedly, I have broken the treatment of England and have interpolated the chapters on Scotland, Ireland, and Wales, for the essential contrasts of our land are only appreciated when it is considered whole.

Britain is described in this book according to progressive methods. It may therefore be advisable to turn back at certain stages in order to apply each new method to the districts already dealt with, especially if one of these happens to be the Home District. For instance, the orographical method employed in the description of Wales may obviously be applied either to a part of Ireland or of Scotland or of the North of England. Similarly the historical method employed in the description of London may be applied to Dublin or Edinburgh.

Certain matters commonly included in the political geography of our country are reserved for comparison with other lands in "Lands Beyond the Channel," the third book of the set of six which constitute this series. Together these books are intended to provide a sequence of teaching through the latter half of the elementary or preparatory stage of education.

In preparing this Eleventh Edition I have scrutinised every sentence with a view to greater clarity and simplicity. A chapter which was included in the earlier editions has been omitted, because the subject of it appeared more pertinent to the book "Our Island History," which I have recently added as the new second of the series. In two other cases pairs of chapters have been condensed into single chapters. The chapter on Railways has been expanded, and ten new black and white maps have been added.

I am very conscious of the trouble which may be caused by such thorough revision of a school book, but in the present instance I believe that the changes made are an adequate compensation. The plates which had been in use during the past seven years had worn out, and the type had to be re-set. A unique opportunity presented itself therefore for incorporating many good suggestions made by experienced teachers, to which it was not possible previously to give effect. I am very grateful to them for their enrichment of my work. The book may now be regarded as having taken its definitive shape.

H. J. MACKINDER.

LONDON, *March*, 1914.

NOTE TO SIXTEENTH EDITION

GREAT changes have occurred in Ireland and in regard to the Railways of Great Britain, and now that the new conditions appear to have been definitely established, I have made what alterations seem necessary in my text.

H. J. M.

LONDON, *November*, 1925.

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OUR OWN ISLANDS

CHAPTER I. OUR ISLAND HOME

Our home is an island. It is one of two large islands off the west coast of Europe.

These islands were called the British Isles by the Greeks, more than two thousand years ago, because they were then inhabited by wild tribes of men known as Britons. The Romans, in the Latin tongue, called one of them Britannia, and the other Hibernia. To-day, in English, we speak of them as Great Britain and Ireland. But we often call the whole British Isles merely Britain, because one word is more convenient than two or three.

Although Great Britain and Ireland are large islands, they look very small beside the vast continent which is known as the Old World. That continent consists of three parts, Europe, Asia, and Africa. It spreads for six thousand miles eastward of Britain to the end of Asia, and for six thousand miles southward of Britain to the end of Africa.

We who live in the British Isles often speak of

the mainland simply as "The Continent." It is nearly three hundred times as large as our islands. Yet these islands are the home of one of the greatest nations, and people have gone out from them who to-day form sister nations in America, Australia, and South Africa.

Let us try to find out how so small a country can be the home of so great a people. Remember

Fig. 2.—A Voyage Round the World. (See also Fig. 3.)

that it is not only size that tells. Some of the cleverest and best men are small men. In the same way these islands, though small as compared with the Continent, are in many things very fortunate.

In most years they are not too hot in the summer, nor are they too cold in the winter, so that men are able to work out of doors all the

year round. Buried in their rocks are great stores of coal and iron, so that our nation has grown rich by mining and manufacturing. But the most fortunate thing of all is that they are islands, and that the sea divides them from the Continent.

For many centuries no army has been able to

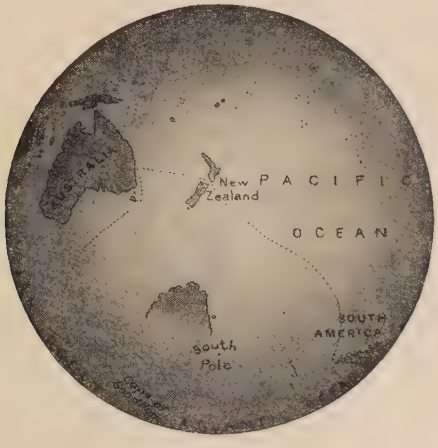

FIG. 3.—See Fig. 2 opposite.
You should follow this voyage also on a globe.

cross the sea and conquer Britain, though a hundred years ago the French Emperor Napoleon assembled a great army at Boulogne, a place in France which you can see in clear weather from some points on our coast. But Admiral Nelson defeated the French Fleet at Trafalgar, and so prevented Napoleon from invading us. During the Great War which began in 1914, the Germans

conquered the Belgian coast on the mainland opposite, but they were not able, any more than Napoleon, to bring an army across the water to invade our island.

Look at the globe, and you will see that the British Isles are divided from the Continent on the east and south by water which is not very broad.

Fig. 4.—The Battle of Trafalgar.

This water is often spoken of as the Narrow Seas.

On the other hand, to north and west there spreads out the vast Atlantic Ocean. A ship can leave Britain, and steaming over the water of the Atlantic, can go southward for several thousand miles. Turning round the Cape of Good Hope, at the end of Africa, it can steam on eastward for several thousand miles more to the great island of

Australia. Then, keeping always eastward for yet more thousands of miles, it can pass round Cape Horn at the end of South America, and so come again into the Atlantic Ocean. Steaming northward through this ocean it returns once more to Britain, having made a voyage round the world.

Therefore the Ocean is the great high road upon which the ships come and go, carrying our trade to all the shores of the world.

It is clear, then, that our island home is fortunate in at least four ways. It has a climate in which we can be strong and active; it has great wealth of iron and coal; it is protected by the sea, so that we have peace and freedom at home; and it is surrounded by the ocean, upon which we can go out into all the world to trade and to found colonies.

To-day men have learned to fly, and can cross the sea in the air. Therefore we must build and man aircraft in which we may go out to trade, and also may prevent an enemy from coming here. But we must not forget that our islands have been safe, and have grown rich by trading, only because we have owned many ships. The ships of Napoleon would have brought the French army here if the ships of Nelson had not prevented them. To-day ships are still of the greatest importance, because they alone can bring over the sea heavy cargoes of food and the raw materials for our industries.

CHAPTER II. THE NARROW SEAS

> As a moat defensive to a house,
> Against the envy of less happy lands.
> —*King Richard II*, SHAKESPEARE.

IN these lines our greatest poet, Shakespeare, tells us that he thought Britain happier than other lands. The reason he gives is that we are defended by the sea.

Shakespeare thought thus, because in his time, three hundred years ago, the King of Spain got ready an army in Belgium to attack England. Belgium at that time belonged to Spain, and the King sent his fleet, which was called the Great Armada, to bring his army over from Belgium to England. But the English fleet beat the Armada before it got to Belgium, and so prevented the invasion.

We saw in the last chapter that two hundred years later the French Emperor Napoleon also tried to invade England, but the English again defeated the enemy at sea, and the French army could not cross over. Nor were the Germans able to cross in the Great War.

We must learn something about the water which thus helps us so well to defend our home.

Let us look at the map (Fig. 6, p. 9) of the British Isles and the Narrow Seas. We see that at one point Britain comes very near to the Continent. At its south-eastern corner Great Britain is only twenty miles from the opposite shore.

The narrowing of the sea at this point is called the Strait of Dover. Every day many people

Fig. 5.—The Spanish Armada.

come and go across the Strait by quick steamers, which in fine weather sometimes make the voyage in less than an hour.

When the weather is clear, you can see the white cliffs of France as you stand on the Castle at Dover, and at the same time the white cliffs of England can be seen shining in the sunlight from the coast of France. The town in France,

where the passengers from Dover land, is called Calais, and French people speak of the Strait as the Pas de Calais.

The sea which divides the British Isles from the Continent widens from the Strait on the one hand into the English Channel, and on the other hand into the great square of water which is called the North Sea.

The English Channel separates England from France. The French call it the Manche, from their word meaning sleeve, because the Channel has roughly the form of a sleeve upon an arm held out eastward, with the wrist at the Strait of Dover.

In poetry the English Channel is often described as the Silver Streak, for the water of the sea glistens in the sunlight with a sheen like that of silver. Shakespeare, for example, has written of Britain as " This precious stone set in the silver sea."

The water of the North Sea washes all the east coast of Great Britain. On the other side it washes the west and north coasts of Holland, and also the shores of Germany, Denmark, and Norway. In the midst of it is the Dogger Bank, where the sea is very shallow. There is great abundance of fish on the Dogger Bank.

Hundreds of fishermen from England, Scotland, Norway, Denmark, Germany, and Holland fish here, and send their catch to be eaten in all the lands around. There are frequent storms and fogs

in the North Sea, so that the life of the fishermen is a rough and dangerous one.

Many other steamers, in addition to those

Fig. 6.—The British Isles and the Narrow Seas.

between Dover and Calais, cross the Narrow Seas between Britain and the Continent. But not only because of the fishermen, and not only because of the steamers to the Continent is there a busy traffic on these seas. Much larger steamers leave the ports of the North Sea and go down the Channel

FIG. 7.—A LINER IN A STORM.

out on to the Atlantic Ocean for voyages of many days.

Sixteen hundred miles away, to the west of Ireland, is another British land on the Continent of America. It is the vast land of Canada. A

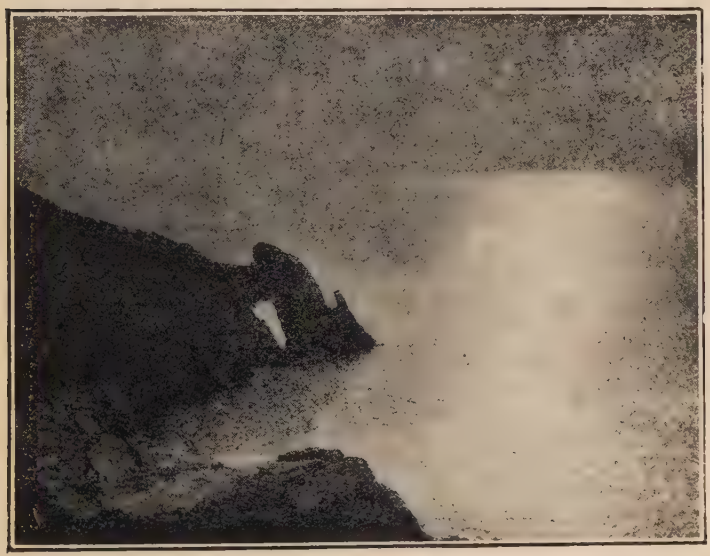

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FIG. 8.—"THE SILVER SEA." THE ENGLISH CHANNEL FROM THE CLIFFS AT TORQUAY.

fast steamer would cross the ocean between us and Canada in six, seven, or eight days, according to its speed.

Think of a colonist who, when young, left some English village and went to settle in Canada. Think of him coming home years afterwards to

visit his friends once more. How impatient he would be, as hour after hour he saw nothing but sky above him and water all round, and at night, when lying in his berth, heard the waves chasing one another past the sides of the ship (*Fig.* 7, *p.* 10). And think of his joy when the ship entered the English Channel, and he saw the lights flashing over the dark water from his native shores.

There are lighthouses on both sides of the

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FIG. 9.—EDDYSTONE LIGHTHOUSE.

English Channel all the way to Dover, so that at night the Channel is like a great water street. Day and night scores of steamers move through it, some crossing it rapidly from coast to coast, but others going up and down its length, just beginning or ending their voyages over the ocean.

Perhaps the most famous of our lighthouses is

that built on the dangerous Eddystone Rocks, off the port of Plymouth, near the mouth of the English Channel. Great waves coming in from the ocean have been known to throw their spray right over the top of it. The stump of an older lighthouse stands on the same rocks. It was injured by the sea and had to be taken down. A third and still older Eddystone Lighthouse was swept away in a storm.

CHAPTER III. THE FOUR PARTS OF BRITAIN

The two islands of Great Britain and Ireland are very different in shape and size. Look at Great Britain on the map. It is a long island stretching northward. It consists of two parts, England in the south and Scotland in the north. These were once separate kingdoms, each with its own king, the one ruling in London, the capital of England, the other at Edinburgh, the capital of Scotland.

In the old times there were many fierce wars between England and Scotland. Even to-day they are still to some extent different countries, with different ways and customs. We are very proud of the brave deeds which were done by our forefathers in the days when they were enemies. But the Scotch and English peoples are now happily united in loyalty to the same king.

On the west side of England there are two peninsulas. The larger of these is called Wales. This also was once a separate country, although it has been united to England much longer than

has Scotland. The eldest son of the King of England is known as the Prince of Wales, and Wales is therefore often spoken of as the Principality.

A great many people in Wales still talk Welsh, which was the language of the ancient Britons. The Welsh, like the Scotch, are proud of their ancestors who fought against England. But England and Wales are now joined into a single friendly country.

To the south of Wales is the other western peninsula, longer than Wales, but narrower. From its position it is often called the West of England. It terminates in a promontory known as the Land's End. In France, on the opposite side of the English Channel, is another promontory, which is called Brittany. These two headlands, the one in England, the other in France, grasp the mouth of the English Channel like two great piers at the mouth of a harbour.

Brittany is called by that name because its people are descended from the ancient Britons, some of whom fled there when the Saxons conquered England. Many of them still talk not French, but Breton, a language so like Welsh that the fishermen of Wales and Brittany, when they meet at sea, can understand one another.

To west of Great Britain lies Ireland. It is less than half as large as Great Britain, but has a more rounded outline. The strait which separates the north of Ireland from Scotland is called the North

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FIG. 10.—THE FOUR PARTS OF BRITAIN.

Channel. It is only thirteen miles across, and is therefore narrower than the Strait of Dover. It is also often called St. Patrick's Channel, from St. Patrick, the patron saint of Ireland.

The strait which separates the south of Ireland from Wales is broader, although on a fine day it is possible from the tops of the Welsh mountains to see the mountains of Ireland. They form a dark,

FIG. 11.—VIEW WESTWARD FROM THE SUMMIT OF SNOWDON, WITH THE SUN SETTING OVER THE MOUNTAINS OF IRELAND.

The steamer is entering the Menai Strait.

jagged edge along the western horizon when the sun is setting. This arm of the sea is called St. George's Channel, from St. George, the patron saint of England.

Almost exactly in the centre of the British Islands is the square Irish Sea, much smaller than the North Sea. Ships enter it from the north-west by St. Patrick's Channel, and from the

south-west by St. George's Channel. The four sides of it are formed by the four parts of Britain. To the north is Scotland, to the east England, to the south Wales, and to the west Ireland.

In the centre of the Irish Sea is the small Isle of Man, whose highest mountain is called Snae Fell, which means Snow Hill, for in the winter it is usually capped with snow. From the top of Snae Fell in good weather you may see on the horizon, in four different directions, the peaks of the Scottish, English, Welsh, and Irish mountains. Thus the Irish Sea differs from the Narrow Seas, which divide Britain from the Continent, because all its shores are British.

Rapid steamers cross St. Patrick's and St. George's Channels between Great Britain and Ireland. The steamers by which most of the letters are carried run from Holyhead, at the north-west corner of Wales, to Kingstown, which is close to Dublin, the capital of Ireland.

There are also much larger steamers which pass through St. Patrick's and St. George's Channels, plying between America and the great port of Liverpool. If you look for Liverpool on the map, you will see that it is placed at the south-east corner of the Irish Sea, almost exactly in the centre of Britain.

Owing to the way in which the sea divides the two islands, ocean-going ships are able to come from the remotest lands to Liverpool, in the very heart of our country. Their cargoes have not

afterwards to be carried very far by railway, and this is well, because it costs much more to take goods by train than by ship.

We can now see why there were once four separate countries in Britain. It is because the sea divides the land into separate islands and peninsulas.

The largest of these countries was the Kingdom of England. The Principality of Wales, in a western peninsula of the island of Great Britain, was early joined to England. The Kingdom of Scotland, in the northern peninsula of Great Britain, was joined later, when the King of Scotland inherited the Kingdom of England. These two kingdoms were afterwards still more firmly united, and were called the Kingdom of Great Britain. Ireland was conquered by England and the north-eastern corner was settled by colonists from England and Scotland some three hundred years ago. The two islands were until lately known as the United Kingdom of Great Britain and Ireland.[1] But those parts of Ireland which were not colonised from the greater Island have lately been separated and are now spoken of as the Irish Free State. The King is there represented by a Governor-General.

[1] It is still correct to speak of the United Kingdon of Great Britain and Northern Ireland.

CHAPTER IV. DIRECTION

Let us draw a plan of the room in which we are sitting. Mark upon it the directions of north, east, south, and west. We know these directions because the sun rises in the east, is in the south at noon, and sets in the west. At night the Pole Star may be seen in the north. A plan is usually drawn so that the north is at the top of the paper.

Take a piece of tissue paper. Fold it twice, crossways, so that when we unfold it there are four creases from its centre. Mark these creases with the letters N., E., S., and W.

Fold the paper up again, and give it another fold, so that when we unfold it, a new crease runs out from the centre, halfway between each pair of the creases marked N., E., S., and W. Label the new creases NE., SE., SW., and NW. These letters, of course, mean north-east, south-east, south-west, and north-west.

We have now a star of eight directions on the tissue paper. Place this star on the plan of the room, and turn it so that the crease marked N. points to the top of the paper. We can read off

the direction of the fireplace, or the door, or any of the windows.

Once more fold up the tissue paper along the old creases. Give the pointed bundle one new fold, and press it well down. Unfold it, and see that each space between the marked creases has a new crease. Label the eight new creases NNE., ENE.,

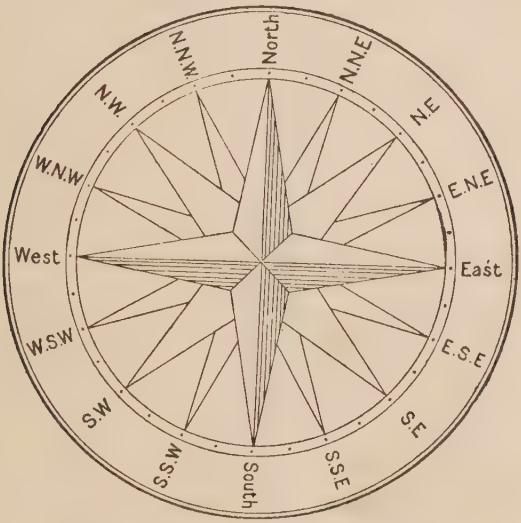

Fig. 12.—The Mariner's Compass.

ESE., SSE., SSW., WSW., WNW., and NNW. What the letters mean is clear.

Our paper is now marked with a star of creases, showing sixteen directions. A sailor would put a new point halfway between each of these, and so he would get his thirty-two points of the compass.

A sailor can find out the direction of north even if clouds hide the sun and the stars. He uses the mariner's compass. The magnetic needle which swings in the compass points always to the north.

Let us turn to the map of the British Isles on p. 23, and let us use the tissue star, which we have so carefully got ready, to find out the directions of the coasts. The north is of course at the top of the map.

Look at the Strait of Dover. Do you see the English Channel widening from it in a WSW. direction, and the North Sea widening at first gradually in a NNE. direction, until it suddenly spreads to its full breadth ?

Notice the long trend of the east coast of Great Britain in a NNW. direction. But see how the centre line of the British Isles, running in a true N. and S. direction, goes through the middle of Scotland, the Irish Sea, Wales, the Bristol Channel, the peninsula of the West of England, the mouth of the English Channel, and the French peninsula of Brittany.

All of Ireland lies to the west of this central line, and all of England lies to the east of it, except the West of England peninsula.

Put a pencil dot on the map to mark the place of our schoolroom, and then let us find out from the map, with the help of our creased paper, the direction of London from our schoolroom. Thus we shall know how to point to London with

our arms when we stand in the middle of the room.

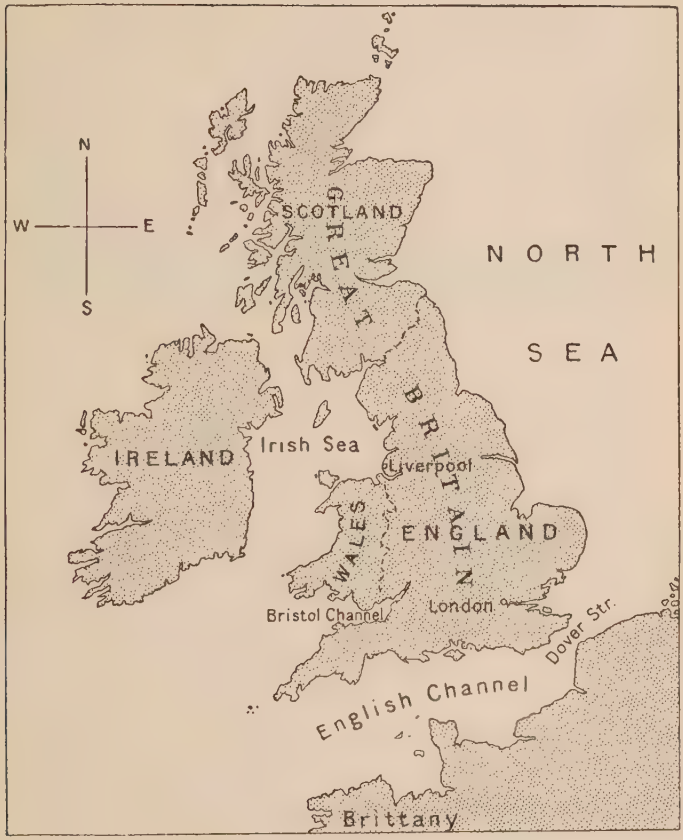

FIG. 13.—THE BRITISH ISLES.
To show the directions of the coast.

If our schoolroom is itself in London, find out the directions of Edinburgh, Liverpool, and Bristol, and point to them.

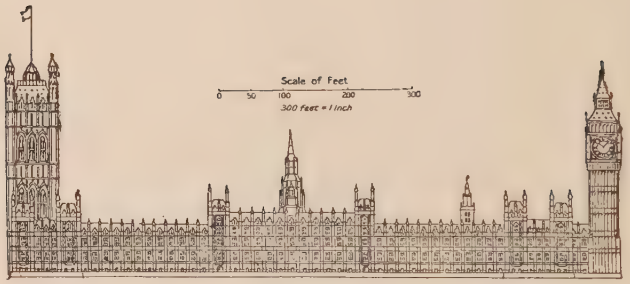

Fig. 14.—The Houses of Parliament at Westminster.
Measure their length and height.

CHAPTER V. DISTANCE

In one of the great picture galleries of London there is a very pretty and very funny picture. It shows an old gentleman, with spectacles on his nose, standing beside the skeleton of a very large bird with a very long beak, and the old gentleman is measuring the length of the bird's beak with an inch measure. The artist has written under that picture, "Science is Measurement." The science which tells us about animals and birds is called Zoology.

Geography is the science which tells us about places. It answers the question, "where is this or that place?" But geography has not only to tell us that Ireland lies to the west of England, and Scotland to the NNW. of England; it has also

to tell us how far we must travel in order to go from one country to the other. We have not only to point the direction, but also to measure the distance. If you wish to cycle from your home to another town in the neighbourhood, you like to know not only which road to take, but also how many miles you will have to travel.

Let us try to measure roughly the size of the land in which we live. Clearly we cannot do this in the same way that we would measure our schoolroom or playground, because Britain is

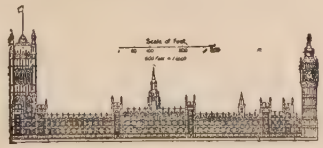

FIG. 15.—THE HOUSES OF PARLIAMENT.

How much smaller is the scale of this diagram than that of Fig. 14?

large, and it would probably take about a year to walk round it. Therefore we must find some other way.

You have already drawn a plan of your schoolroom, perhaps even a little map of your street or road, and you know that it is possible to draw such a plan or map "to scale." We say that a map is drawn to scale when an inch upon the paper represents a foot upon the ground, or perhaps half an inch on the paper represents a yard on the ground.

If you have drawn your plan correctly to any scale that you like, another person by measuring

the length of a line on your paper will know the real size on the ground. He will say to himself that every inch or half-inch on the paper represents a foot or a yard or some other length on the ground.

A map is only a plan, drawn to scale, of a whole country. By the long work of many men, the British Islands have been so carefully measured, that a map of them can be drawn so that every inch of it represents, say, one hundred miles of land and sea.

Now it is clear that though you have not actually measured, and never will actually measure, the British Islands on the ground, yet you can find out for yourself from a map how large they are.

This is the way that you do it. In one corner of the map you will see a line marked off into spaces. This line is called the scale of miles. Take the straight edge of a piece of paper, and with your pencil mark off on the paper from the scale a distance of four hundred miles (*Fig.* 18, *p.* 29).

Lay the edge on the map in the direction of London to Edinburgh. You will see that the distance from one to the other of these cities by crow-fly—that is to say, over hill and valley in a quite straight line—is a little less than four hundred miles. The distance is almost exactly four hundred miles by the railway, because it does not go quite straight, but winds round some of the hills.

The scale in the corner of the map is marked

" statute " miles, because the mile in ordinary use has been fixed by Act of Parliament or Statute. Sailors use " nautical " miles, which are a little longer than statute miles.

Let us mark the position of our own town on the map in Fig. 18, and then let us spend a few minutes measuring the distances from our town to five of the largest towns in the British Isles—London, Manchester, Liverpool, Dublin, and Glasgow. In the next lesson we will go on with our measurement of Britain.

CHAPTER VI. THE SIZE OF BRITAIN

Now that we have learned how to use the scale of the map, let us try to answer the question—"How large is Britain"? We will consider the island of Great Britain. First of all we must settle from what points along the coast we will take our measurements.

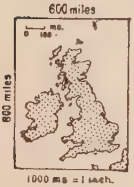

FIG. 16.—BRITISH ISLES (to illustrate scale).

In the north-west of Scotland you will see on the map that the land stands out into the ocean like the corner of a house. The edge of this corner is a high cliff known as Cape Wrath. We will make this the first of our points.

In the south-west of England is the promontory of the Land's End. It projects from the rocky, but not very high, land of Cornwall. The Land's End will do very well for the second of the points from which to take our measurements.

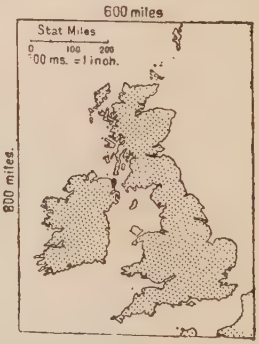

FIG. 17.—BRITISH ISLES.

The third shall be at Dover, at the corner of England which is within sight of the Continent.

Now take a paper with a straight edge to it, and mark on it a hundred miles according to the scale of the map. Measure with its help the distance in a straight line from Dover to Cape Wrath, and then from Cape Wrath to the Land's End, and

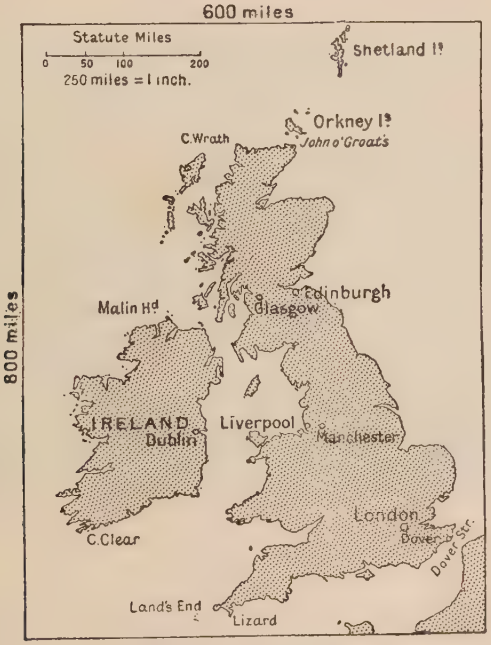

FIG. 18.—BRITISH ISLES.

then from the Land's End back to Dover. Set down in miles these three distances, and add them up. If you have measured them rightly, their total will be about fifteen hundred miles.

Next measure the length of Ireland from north

to south, that is to say, from Malin Head to Cape Clear. The latter cape is on a little island detached from the mainland of Ireland. If you have measured rightly, you will find that the length of Ireland is less than half of the length of Great Britain from Cape Wrath to the Land's End.

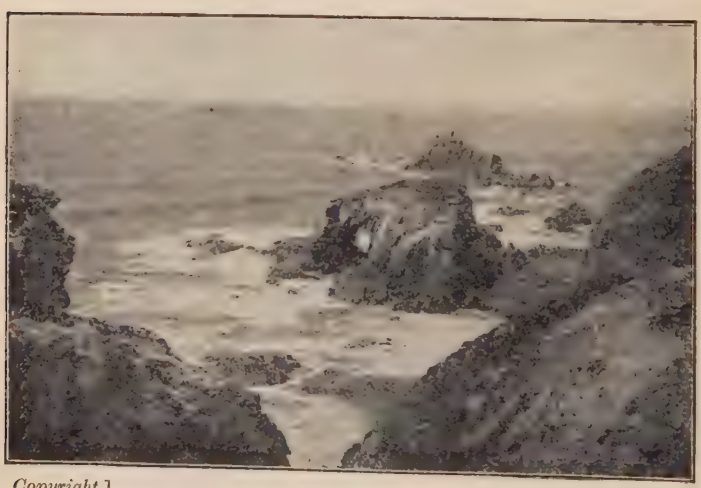

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FIG. 19.—THE LAND'S END.

When we wish to talk of the whole length of the island of Great Britain, it is very common to say "from the Land's End to John O'Groat's," because in the far north of Scotland, but eastward of Cape Wrath, there was once a house which belonged to a Dutchman called John of Groat. This was the last house in Scotland in the direction of the Orkney Islands.

Let us practise a little more in the use of the scale of miles. For example, let us measure the distance from the most eastern to the most western point of the British Isles, and then from the most northern point to the most southern.

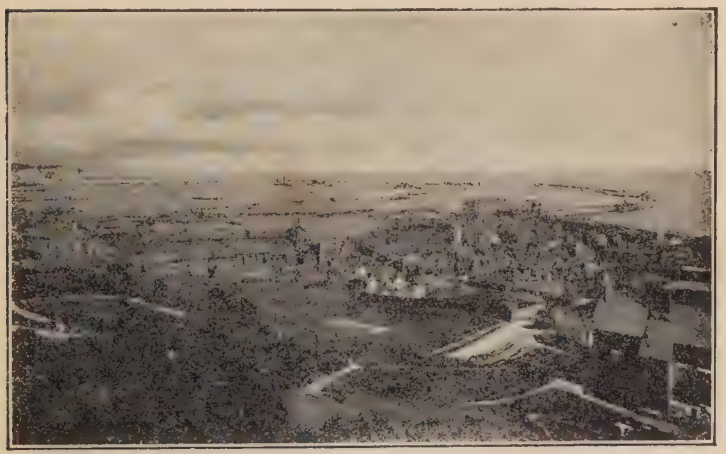

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FIG. 20.—DOVER HARBOUR.

Note the breakwater and the two entries.

The most northern point is on the Shetland Isles, and the most southern point is called the Lizard.

We ought now, with the help of a map, and its scale of miles, and a tissue star, to be able to answer any question put to us about the directions and distances of the places marked on our maps.

CHAPTER VII. THE TIDES

Time and Tide stay for no man.
—English Proverb.

We all know that a wind, even a little wind, raises ripples on the surface of the water. This you may

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Fig. 21.—Blackpool at High Tide.

see on any pond or stream. If you live by the seaside, you know that the sea is very seldom quite calm. Sometimes, when it is swept by a strong

wind, the sea runs in great waves, and at such times ships are wrecked and men drowned.

If we go to the seaside where there is a broad sandy shore, on which the children dig, we notice that the waves of the sea do not always break in the same place. Little by little they creep up the shore as the hours go by, until they reach

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FIG. 22.—BLACKPOOL AT LOW TIDE.

high water mark, and then little by little they return to low water mark. There is high water about every twelve hours. This forward and backward movement of the sea is called the tide.

In the autumn, when the seaweeds break away from their roots in the great forests of the sea-bed, there is a line of weed left by each tide all along

high water mark, and men come with carts and take the weed away for manure on the fields.

When the tide is out and the sand is left dry, men go with nets to fish for shrimps in the pools

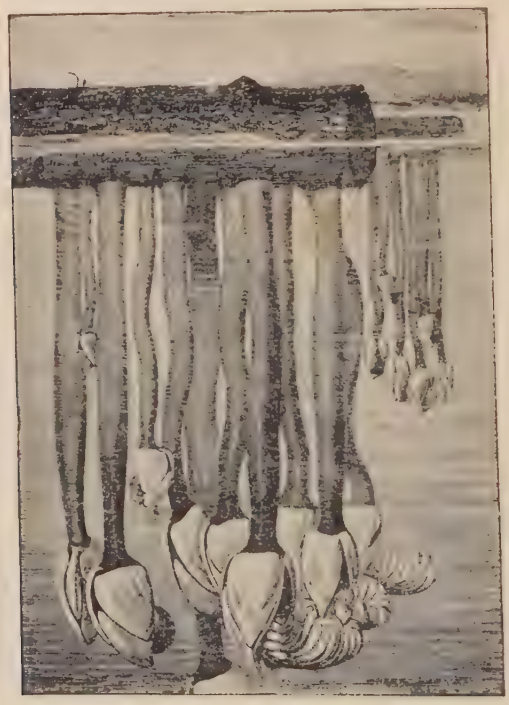

Fig. 23.—Barnacles.

of water which remain here and there upon the shore.

The tide behaves with great regularity. It comes in and goes out twice every day. But high tide is a little later each day, because

there is a little more than twelve hours between one high water and the next. Moreover, there are large or spring tides one week, and small or neap tides the next week.

There are some places where there is no sandy shore, and where the great cliffs rise straight from the water's edge. A boat cannot approach such cliffs in ordinary weather, because the waves are too strong, and the boat would be crushed against the rocks.

On very rare days, when there has been no wind for some time, you can go right up to the foot of the cliff. If you get there at low water, you will see a line marking high water a few feet up the cliff. On the rock below this line are hundreds of shell-fish, clinging to the face of the cliff, mostly limpets and barnacles. They are waiting patiently for the water to rise again and cover them. You may see the same thing if you walk out along the foot of a pier at low tide.

Now think what must happen when the tide rises at the mouth of a river. The water must, of course, run up into the mouth of the river, just as it runs up over a sandy shore. If you stand on a bridge spanning a tidal river, and watch the water beneath, you will see that at one time of day it is running up into the land. Men say that the tide is then flowing. At a later time, when the tide has turned, the water runs down the river to the sea, and the tide is then said to be ebbing.

The tides run a long way up many of the British rivers. Look at the map of England in Fig. 25, p. 39, and find the Humber on the east coast. You will see that it receives two large rivers, the Ouse from the north and the Trent from the south.

The tide not only runs up the Humber to its head, but it continues up the Ouse nearly to York, and up the Trent a little beyond Gainsborough. If you measure the distance from the Humber mouth to the head of the tide-ways on the Ouse and Trent, you will be surprised to learn how far inland the tide penetrates. Ships make great use of the flowing tide when going up rivers.

Look now to the south-west of England, and see the great estuary of the river Severn. The word "estuary" is taken from a Latin word which means "tide." An estuary is the part of a river near its mouth which is entered by the tide. The tide goes up the Severn nearly to Gloucester, and it goes up the river Avon, which falls into the Severn, as far as the great port of Bristol.

A very wonderful thing happens in the Severn at the highest or spring tides. The Severn runs strongly, because it brings much water down from the Welsh mountains. But the tide rises very high and falls very low on this part of the English coast. The result is that at spring tides the sea water, running up against the out-flowing fresh water, makes a wave which is called the Bore. You can hear the Bore coming up the

river with a great noise when it is several miles away.

There is a wave like the Bore, but not quite so large, in the Humber and in the Trent. It is there called the Eagre. At the time of spring tide, on a fine moonlight night, it is very grand to hear the Eagre coming up the river. The boatmen call to one another "'Ware Eagre," which means "Beware of the Eagre." And then you see the line of foam, four or five feet high, come round a corner in the river, white in the moonlight sheen.

The tide runs up the river Thames as far as Teddington, which is a place twenty miles higher up than London. Although there is no Bore or Eagre in the Thames, yet the ebb and flow are very strong, and at spring tides high water is twenty feet above low water at London Bridge.

If you go to Gravesend, a place twenty miles lower down the river than London, you will often see many steamers anchored, waiting for the turn of the tide, because at low water the river above Gravesend is not deep enough for large vessels.

When the tide has turned, and is flowing once more, the steamers proceed up the river and enter the docks. These are large, deep spaces of water, surrounded by stone quays for the landing of goods and passengers. The ships enter the docks at high tide, and the dock gates are then closed, so that when the tide begins to fall, the water within

the docks cannot flow out. Thus the ships within a dock remain floating when the water has fallen low in the river outside.

Look once again at the map of the British Islands (*Fig.* 25), and see how rich the British

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FIG. 24.—A DOCK.

The water is held up within the dock by means of the closed gates in the middle of the picture.

coast is in great estuaries, swept by tidal waters. Find out as you go round the coast the names of some of the largest of them.

On the east side of Scotland you have the Firth of Tay, leading up to the great port of Dundee. The word "firth" is a Scotch word meaning "estuary." A little to the south you

have the still larger Firth of Forth, which leads to the port of Leith, close to Edinburgh. The rivers Tay and Forth come down into these firths.

FIG. 25.—THE TIDAL RIVERS OF BRITAIN.
Note the scale of nautical as well as statute miles.

Then some distance more to the south, on the coast of England, you see the Humber, of which

we have already spoken. Hull is the chief port upon the Humber. After that comes the Wash, a broad, but shallow and inconvenient estuary, leading to the small ports of Boston and King's Lynn. Last on the east coast is the estuary of the Thames, leading to the very great port of London.

On the south coast we have Southampton Water and the port of Southampton. On the west coast are the Bristol Channel, with the estuaries of the Severn and Avon, and the ports of Bristol and Cardiff. Farther north we have the estuaries of the rivers Dee and Mersey, with the small port of Chester and the great port of Liverpool. And last, on the west coast, we have the Firth of Clyde, at the head of which is the port of Glasgow.

In Ireland we note the port of Limerick on the estuary of the Shannon, which is the longest of all British rivers.

To reach all these ports ships make use of the flowing tides. Thus we see that British trade owes much to the tides.

In most other parts of the world there are smaller tides than in the British seas. In the open Atlantic Ocean, some distance west of Ireland, the difference between high and low water is only two or three feet. Here then we have a fifth reason for counting Britain a fortunate land. We will look back to the first chapter and refresh our memories as to the other four.

CHAPTER VIII. THE BACKBONE OF ENGLAND

A TRAVELLER lands at Dover, and hires a bicycle or motor car, and rides north-westward through England. What kind of country does he see ?

For more than half the breadth of the island he crosses a gently rolling country, with a few belts of low hill. Nearly everywhere he beholds a network of hedgerows. At first, while he is passing through Kent, he sees beautiful hop-gardens and large apple-orchards.

At the end of Kent he comes to the houses of London, and for nearly twenty miles he runs through the red brick streets in a smoky atmosphere. In the middle of the great city he crosses the Thames by one of the bridges, and sees the river flowing rapidly beneath him, either running up with the flood tide or down with the ebb.

Then he leaves London behind, and passes through the Midlands, a land of broad fields and rich green meadows. At last he comes to Derby, and sees before him, if the weather be clear, larger hills than any of the lesser heights which he has passed on his journey through the plain.

Copyright.] [*Sutcliffe.*

FIG. 26.—A MOOR.

These hills mark the beginning of a land of high barren moors in the north of England and in Scotland. The moors have grey stone walls instead of verdant hedges. They have few trees, and are clothed only with grass, or moss, or heather. But here and there are mountain peaks and tumbling streams, wooded slopes and silvery lakes, and at last, on the borders of the ocean, towering surf-beaten crags.

So you see that Great Britain consists of two parts. In the south is a low-lying, fertile country with farms and hedges and woods, but in the north and west are many high and naked hills, fit only for the pasture of sheep, and for the wild deer. If you look at Fig. 27, p. 44, you will see the hills tinted and the lowland left white.

Before our traveller sets out again from Derby to explore the north, he rests a while to read his guide book and study his map, in order that he may know exactly where to go, and by what roads. Let us look at the map and help him to plan his journey.

First of all let us find the towns Derby and Stafford on Fig. 27, and let us draw a line from one to the other. Then let us find the towns Newcastle and Carlisle, and let us draw a line joining these two places. Most of the country northward of Derby and Stafford, as far as Newcastle and Carlisle, consists of broad high moors.

By using the scale of miles, you can measure

FIG. 27.—NORTHERN ENGLAND. RAILWAYS.

Fig. 28.—Northern England, Physical.

upon the map the length, northward and southward, of this belt of high country, which is known as the Pennine Moors, or often as the Pennine Chain.

Sheffield and Manchester stand at the edge of the Moors, the one at the eastern edge and the other at the western edge. You can, therefore, easily measure the breadth of the Pennine Chain.

The highest part of the Pennines is at Cross Fell, near the point where the counties of Cumberland, Westmorland, and Durham meet. The top of Cross Fell is a little less than 3,000 feet above the sea-level, or about half a mile high.

It is very useful to remember that a mile contains rather more than 5,000 feet, so that if you hear that a mountain measures 5,000 or 10,000 feet, you can at once turn its height into miles.

All hill heights are measured from the sea level. You know how flat and level the water stands in a glass or in a pond. It is the same with the sea. Even the largest waves do not interfere with the general level of the vast ocean. You hardly notice them when you look down on the blue water from a high cliff.

Let us now try to picture to ourselves the shape of the whole Pennine Chain. We have learned, by measuring upon the map, that the moors are several times longer than they are broad, and if you remember the height of Cross Fell, you know that they are many times broader than they are high.

The Pennine Chain is like a great uneven slab of stone lying along the centre of the north of England. When a thing stands up in this flattened way, like the King's head on a penny, we speak

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FIG. 29.—IN THE CHEVIOT HILLS.

The cattle are grazing below, while the snow still lies on the hill-tops above.

of it as being in "low relief," or in "bas relief," from the French word "bas" which means "low."

On the top of the Pennine Chain you can walk in the brisk upper air for miles and miles over the grass and heather of the great rolling moors. When at last you come to the edge of the high ground you look down on to broad corn fields and meadows, spread over the lowland beneath.

If you live in a hilly country, you must often have seen that the snow rests on the hill tops long after the thaw is complete on the lower ground. Corn and most other crops will not grow in England at heights much greater than a thousand feet above the sea, because even in summer the air is cool above that height.

Thus it is that all the moorland tops of the Pennine Chain are covered merely with grass and heather. But this poor herbage serves to support on the heights great numbers of sheep.

I think you will now see why we describe the Pennine Chain as the Backbone of England. It rises along the centre of the north of England like the bony ridge in the middle of your back.

CHAPTER IX. THE RIVERS OF THE NORTH OF ENGLAND

THERE is more rain on the hill tops than on the plains below them. In a hilly country the sum-

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FIG. 30.—CALDRON SNOUT, A FALL ON THE TEES.

This shows the first part of a river, the torrent in the hills, near the source.

mits are often hidden in cloud when there is bright sunshine a short distance away. The

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FIG. 31.—SWALEDALE.

This shows the second part of a river—the brawler, but still shallow stream in a wide valley.

Pennine Hills send down into the lower country a great number of rapid streams.

These streams begin near the centre of the moorland, and run through it in narrow valleys,

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FIG. 32.—THE OUSE AT CLIFTON, NEAR YORK.

This shows the third part of a river, the tranquil, navigable water in the lowland plain.

which at last become so deep, and have such high steep sides, that they are called "Dales."

Look at Fig. 28, and see how the rivers come out of the Pennine Hills, and flow across the plains, either eastward into the North Sea, or westward into the Irish Sea. You know the high moors and the low plains by the grey and the white on the map.

Starting in the north, on the eastern side we have three rivers, the Tyne, the Wear, and the Tees, which run direct to the North Sea.

Then we have the Swale, Ure, Nidd, Wharfe, Aire, Calder, and Don, which do not go direct to the sea. When they have come out of the dales and are clear of the edge of the moors, they join together to make a large river. This river is the Ouse. As you see on the map, the Ouse flows southward through a low plain, which is known as the Vale of York. The ancient city of York is in the midst of the vale.

Let us now look at Fig. 27, and note the exact meaning of the tinted and white spaces. The meaning of the one is that the country is more than 600 feet high, and of the other that it is less. Let us enquire and write down the height of our schoolroom above the sea.

The Ouse has a broad, slow current, because it flows through the low plain, but the streams which come down to it from the Pennine Chain fall rapidly through the dales, splashing and laughing over the rocks. Therefore the Ouse itself is navigable for barges and other small ships, but the streams which join it from the dales are not navigable. On the other hand they can be used to turn mills for grinding flour, or for grinding knives to a sharp edge, as at Sheffield. The streams which thus pour water into a main river are called its tributaries.

Look once more at Fig. 28. The southern part

of the Pennine Chain is called the Peak of Derbyshire. Here you find more streams, descending from the high ground through narrow valleys into the plain of the Midlands, where they are gathered up by another large sluggish river, the Trent. The chief tributaries to the Trent from the Peak are the Dove and the Derwent.

The Trent, as you observe, flows right round the south end of the Pennine Chain, and then northward until it meets the Ouse coming southward. The two rivers together make the great estuary of the Humber, which flows eastward and at last opens to the North Sea.

You will remember that the word "estuary" means the tidal mouth of a river. You will remember also, from Chapter VII, that the tide runs up the Humber to its head, and then for some distance northward up the Ouse and southward up the Trent. The inflowing tide meets the water flowing down from the Pennine heights, and fills the estuary.

All the water carried out to the sea by the Humber falls upon the land as rain. Upon Fig. 28 you may draw a line round the sources of the tributaries which flow into the Ouse and the Trent. A great space may thus be enclosed, and this space we call the Basin of the Humber. Within the basin the rain water is everywhere flowing gradually down, and gathering into the Humber.

The Vale of York lies between the Pennine

Moors to the west and a belt of hilly ground to the east, which is not so high as the Pennine Chain. The Humber on its way to the sea goes by a gap right through these eastern hills, dividing them into two parts, the Yorkshire Wolds to the north, and the Lincolnshire Wolds to the south.

In Fig. 27, you see that only a small part of the Yorkshire Wolds is tinted, and none of the Lincolnshire Wolds. Thus you know at once that in most parts the Wolds are less than 600 feet high.

Once more turn to Fig. 28, but this time look at the country west of the Pennine Chain. Here you see three rivers, the Mersey, the Ribble, and the Lune, flowing out from their dales and across the narrow coastal plain of Lancashire. It is called a coastal plain because it extends along the coast, and is not divided from the sea by hills, as is the Vale of York.

You may draw a line northward through the Pennine Chain, in such a way as to divide the heads of the streams going to the North Sea from those going to the Irish Sea. This line is called the Pennine Divide, or the Pennine water parting, because it divides or parts the rain water which flows through opposite dales to two different seas.

Two drops of rain may fall only a foot apart beside this Divide, and the one may be carried by the Aire or the Don into the Ouse and the Humber, and so into the North Sea, while the

other may run by the Ribble or the Mersey into the Irish Sea.

The line upon the map which marks the Pennine Divide is the same as that which we drew just now to enclose the west side of the Humber Basin. The Pennine Divide therefore parts the basin

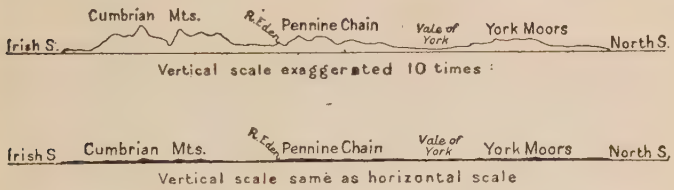

FIG. 33.—SECTION ACROSS THE NORTH OF ENGLAND.

On Fig. 27 indicate the line along which this section has been drawn.

of the Humber on the one side from the basins of the Lune, Ribble, and Mersey on the other side.

Let us examine carefully the vertical sections shown in Fig. 33. The word "vertical" means upright, but "horizontal" means level like the horizon. The word "section" means a cut, as though with a knife.

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FIG. 34.—NORTHERN ENGLAND, COUNTIES.

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FIG. 35.—YORK MINSTER.

CHAPTER X. THE COUNTIES OF THE NORTH OF ENGLAND

OUR friend who landed at Dover is now resting at Derby. I think you will agree that we must not advise him to continue his journey to Scotland along the centre of England. If he did so, he would have to traverse the whole length of the Pennine Chain. The roads are bad on the bleak moorlands, because of the long winter frosts.

Therefore we will suggest to him that he should go northward through the Vale of York. Thus he will keep on the low, level ground to the east

of the Pennines. He might also go by the plain of Lancashire to the west of the Pennines.

The way past York, and along the sea coast of Durham and Northumberland, is known as the East Coast route to Scotland. The way through Lancashire is the West Coast route.

The traveller will have to take his bicycle or motor car across the rivers which flow out of the dales, and he will therefore have to find from his map where are the bridges. One of the most important of these bridges crosses the Tyne at Newcastle. That name was given, when it was new, to the castle built in olden times to protect the bridge.

Formerly very few people lived in the Pennine dales, and even to-day there are very few on the higher parts of the moors. The ancient towns, like York, were built on the low ground. They were the market towns of the fertile country around. York, as we have seen in Chapter VII, was also a port, which could be reached by small ships from the North Sea. Being therefore both a market town and a port, York was a rich place, and our ancestors were able to build there a splendid cathedral, which you should go and see if ever you have the chance.

Look at the map of England as divided into counties. Do you see that the counties of the north are grouped round the Pennine Chain? There are nine of them—Northumberland, Durham, Yorkshire, Derbyshire, Staffordshire, Cheshire,

Lancashire, Westmorland, and Cumberland. From Staffordshire northward the boundary between them very nearly follows the Pennine Divide. This you may see by comparing Fig. 34 with Fig. 27. Let us ask ourselves the reason why.

I think we shall find the answer in what follows. In olden days the important towns were placed, as we saw just now, among the farms of the plain and on the navigable rivers. The villages also were numerous in the fertile lowland, east, south, and west of the Pennine Range.

But the moors, and even the dales, had very few houses. It was difficult, and at times even perilous, to cross the hills from the east to the west of the country. The hills are steep, and the roads over them very bad. In the winter time the snow on the heights lies deep, and is swept by bitter winds.

It is hard for us to realize to-day how toilsome was once the journey across the north of England. We are now carried comfortably under the moors through railway tunnels. The train winds up a dale, until the dale becomes too steep near its head. Then the train plunges into a tunnel under the Divide, and emerges in the head of a dale on the other slope.

All the nine county towns round the Pennines—Newcastle, Durham, York, Derby, Stafford, Chester, Lancaster, Appleby, and Carlisle—are situated on ground low enough not to be tinted on Fig. 27.

Five of the Pennine counties are named after their chief towns, with the addition of the syllable "shire," which resembles the word "share," although not derived from it. So you learn that the low country round the hills was divided for

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FIG. 36.—ASHWOOD DALE.

A stream, a road, and a railway, side by side thread this dale, and many others.

purposes of government between nine towns. Each of these towns took its share or shire.

The people in the dales could very easily go down dale to the plain, though in all other directions they were pent in by high hills. Therefore the counties of the plain extend up the dales to their heads, and the county boundaries are at the Divide of the drainage on the Pennine Moors,

or very near to it. Thus we see why the counties of the North of England are grouped round the Pennine Chain.

But there is one dale which belongs to Yorkshire, though it is on the west slope of the Pennines. You will easily find it on the map, for it

From Photograph] *[supplied by L.M.S. Railway.*

Fig. 37.—Cowburn Tunnel, on the L.M.S. Railway.

is the dale of the Ribble, one of the three rivers flowing across the Lancashire plain into the Irish Sea. If we look at Fig. 27, we shall learn how it was possible, even in the old days, to rule the people of Ribblesdale from York.

Do you see the strip of white, which follows the river Aire, and then goes right across the Pennines

to the Ribble? This means that there is here a gap through the moors which is less than 600 feet above the sea. The Aire Gap, as it is called, divides the Pennine Chain into the North Pennine Moors and the South Pennine Moors. At all times an easy road has led through this gap from the Ribble to York.

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FIG 38.—DURHAM CATHEDRAL AND CASTLE.

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FIG. 39.—COAL MINING.

The cage in the shaft by which the colliers go down to their work.

CHAPTER XI. THE INDUSTRIES OF THE NORTH OF ENGLAND

THE highest and most central parts of the Pennine Moors are still very lonely. But in the last two hundred years a great change has come over the country along the edges of the range. There are rich beds of coal along both its eastern and its western borders. These were not worked in the old time.

Since the invention of the steam engine coal has given rise to vast industries both in Yorkshire

and Lancashire. Therefore great towns have been built in the dales and on the lower moors, where once there were only rare cottages and a few sheep. Most of the change has happened since

(*By permission of the Geological Photographs Committee of the British Association.*)

FIG. 40.—A SEAM OF COAL.

Most coal seams are deep down in the ground, but here is one on the surface near Glasgow. Note the tree-stumps, made of coal, which have been exposed by digging away the rest of the seam. Every seam or bed of coal was a forest long ages ago.

the days when our great-great-grandfathers were boys.

Let us find some of these young but very large towns in Fig. 43, and also in Fig. 27. We see that Leeds and Sheffield are placed just where the dales of the Aire and the Don open to the Vale of York. Bradford, Halifax, and

Huddersfield, on the other hand, are higher up the dales, and are surrounded by steep hills.

On the western side, in Lancashire, we have Manchester, Bolton, Oldham, and Blackburn, all of them either in the dales, or near where the dales open to the plain of Lancashire.

The industries supported by the Pennine coalfields are the spinning and weaving of wool and cotton, and the manufacture of iron and steel.

The woollen trade is chiefly in the West Riding of Yorkshire. This county, because it is the largest in England, is divided into three Ridings—North, East, and West. The Pennine Range is mainly in the West Riding, and the woollen trade sprang up there, because wool was to be had from the sheep on the moors, and because the water in the dales is very pure, and suitable for washing the wool.

But now that coal is used to drive the machinery, and the trade has grown enormously, the Pennine wool is not nearly enough to supply the looms of the district. Raw wool is therefore imported from distant Australia.

Cotton is manufactured round Manchester, on the Lancashire coalfield, to west of the Pennines. It is manufactured there, partly because much of the raw cotton comes across the Atlantic from America, and is most easily imported by the western port of Liverpool.

But there is also another reason. A moist atmosphere is needed for the spinning of the

better kinds of cotton, because the cotton fibre becomes brittle and breaks when the air of the mill is too dry. The winds from the Atlantic bring much moisture to the western side of the Pennine Hills, but the eastern side is sheltered from the moist west winds.

(*From Stereograph Copyright, Underwood & Underwood, London and New York.*)

FIG. 41.—A COTTON FIELD IN AMERICA.

The east winds are usually dry in England, because they blow from the great continent of Europe and Asia, and have to cross only the comparatively narrow North Sea, instead of coming off the great Ocean.

Sheffield, and the towns near it, are placed on

the eastern coalfield, but farther south than the woollen district. They owe their importance to the gritty sandstone of which much of the Pennine Range is made. Near Sheffield this stone is of a kind very suitable for the grinding of knife edges. The rapid streams of the Pennine dales serve to

Fig. 42.—A Cotton Mill in Lancashire.

turn the millstones on which the knives are ground. We speak of the making of knives as the cutlery trade.

There is one very interesting reason why the cutlery trade was established at Sheffield. A hundred years ago Englishmen had not yet learned how to make good steel from their own iron ores.

Very pure iron, suitable for making steel, was then only to be had from Sweden across the North Sea. In the days before railways Sheffield was very conveniently placed to receive the Swedish iron. It was brought up the river Don from the port of Hull. Even now much iron ore comes to England from Sweden as well as from Spain.

What a striking contrast we have in the Pennine district! In the higher part of the Moors you may walk sometimes for a whole day and meet no one. But in the lower parts of the dales, and on the hill shoulders which overlook the plain, there is a very dense population. Here there are large towns, and hundreds of tall smoky chimneys belonging to the factories and the collieries.

Along the coasts of the north of England are great ports, whose docks are crowded with ships. Busy railways cross the pleasant farming country, carrying the traffic to and fro between the industrial towns on the coalfields and the shipping on the coast. The chief ports of the north of England are Liverpool on the west, and Hull, Middlesbrough, Sunderland, and Newcastle on the east. All these ports, you will observe, are on the estuaries of rivers.

There are other large towns beside the sea which have recently sprung up, not for commerce, but for pleasure. These are the places where the people of the smoky industrial towns like to spend their holidays. The largest of them are

Scarborough on the east coast, and Blackpool and Southport on the west coast.

Let us look once more at Figs. 27 and 28, and

FIG. 43.—THE COALFIELDS OF THE NORTH OF ENGLAND.

You should compare this map with Fig. 27.

let us try to make a picture in our minds of the whole district which is known as the North of England.

See how the Irish Sea invades the breadth of the

island, taking a great square out of it, and reducing England in this part to an isthmus. And see how the Pennine Range runs northward through the isthmus, making a backbone for the land. Think of the high lonely belt of the central moorland; think of the busy, smoky districts on either hand, placed along the two edges of the moorland; think next of the green and cultivated lowlands, through which run the eastern and western roads to Scotland; and then think lastly of the two sea shores, the eastern and the western, and of their ports and their pleasure towns.

What does not Britain owe to the coal buried in her rocks, and to the seas which carry her trade!

CHAPTER XII. THE LAKE DISTRICT

Our traveller has now seen the manufacturing districts of Lancashire and Yorkshire, and he continues his journey northward to Newcastle. Being a sensible man who wishes to see something of the country, and not merely to rush through it at the highest speed, he determines to stop a while at Newcastle.

Here we will advise him to make an excursion westward, in order to climb Cross Fell, the great hill at the northern end of the Pennine Chain.

Cross Fell rises, as we have already learned, to a height of nearly three thousand feet. In fine weather both the North and the Irish Seas are visible from its summit. They appear as bright lines along the eastern and western horizons. The snows of winter remain long upon the crest of Cross Fell, and in some years have been seen there throughout the summer.

Three rivers—the Tees, the Wear, and the southern head-stream of the Tyne—rise in the moors which slope gradually eastward from Cross Fell. Away to the north of the mountain is a deep gap, clearly shown on Fig. 45, p. 73. This

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FIG 44.—WINDERMERE.

gap separates the Pennine Chain from the Cheviot

FIG. 45.—THE LAKE DISTRICT.

The untinted part of the land would be flooded if the sea rose 600 feet.

Hills. It is known as the Tyne Gap, from the river Tyne.

Looking from Cross Fell southward, eastward,

and northward, you see only the broad moorlands, which occupy the north-western corner of Yorkshire and the west end of Durham. Of these moors the highest are known as Ingleborough, Whernside, and Penygant.

Westward from Cross Fell, however, there is a very different scene. The mountain descends steeply into a long, beautiful valley, through which the River Eden flows to Carlisle and Solway Firth. Across the Eden Valley rise the mountains of the Cumbrian Group, so named from the county of Cumberland, in which both they and the Eden Valley are mainly situated. These mountains are called a group rather than a chain, because they lie in a cluster, almost as broad from east to west as from north to south.

Sometimes, in the early morning, the clouds fill the Eden Valley, and you may look from the summit of Cross Fell over their white fleecy surface to the Cumbrian peaks, rising in the west like an island out of a cloud sea.

The Pennine Chain has in general a rounded and tame outline. It is mostly covered with coarse grass and heath, which give it a dreary and desolate aspect.

But the mountains of the Cumbrian Group are bold and steep. In some parts they are crowned with woods, and in others clothed with the finest greensward, but the highest points are of naked rock. The streams flow outward from the centre of the group, trenching the high ground with

deep valleys, in the bottoms of which rest long winding lakes.

These lakes are so characteristic of the Cumbrian Mountains that this part of the country is often described as the Lake District.

The highest of the Cumbrian peaks are Sca Fell, Helvellyn, and Skiddaw, each rising to more than three thousand feet above the sea. Sca Fell is the highest point in England, although not so high as several mountains in Wales. The whole west coast from Anglesea in Wales to the Mull of Galloway in Scotland, and also the hills of the Isle of Man, are visible from it. On one of those rare days of bright sunshine, when there is neither haze in the air nor cloud in the sky, the mountains of Ireland can just be discerned on the horizon.

The Cumbrian Group is joined to the Pennine Chain by a saddle of moorland, a thousand feet high, which is called Shap Fell. The water parting between the Eden flowing northward and the Lune flowing southward is on Shap Fell.

The London, Midland and Scottish Railway, following the West Coast route, comes over Shap Fell on its way from Lancaster to Carlisle. The ascent is toilsome, and the trains are often hauled up by two engines, one of which is taken off again at the top.

The longest of the lakes of the Cumbrian Group is Windermere. It is more than ten miles long, but not two miles broad, for it lies along the bottom of a valley.

Another lake, Thirlmere, in one of the northern valleys of the Cumbrian Group, has been utilized for the supply of water to the city of Manchester. The water is carried southward in a long tube known as an aqueduct. Let us measure the distance upon the map between Thirlmere and Manchester.

The difference between the romantic landscapes of the Lake District and the tamer scenery of the Pennine Chain is due to the difference of their rocks. In the Lake District we have chiefly jagged slates, set on edge, and hard volcanic stones dating from very early ages in the world's history. These rocks form peaks.

In the Pennine Chain, on the other hand, the most frequent rock is millstone grit, a kind of sandstone, which weathers into rounded mounds and long lines of slope, and not into peaks.

In many parts of the Pennine Chain, however, there is a beautiful limestone, which makes fine cliff scenery, especially in some of the dales (*Fig.* 36, *p.* 60). This limestone is well seen in the southern end of the chain, which is known as the Peak. The valleys of the Dove and the Derwent there form remarkable gorges with limestone cliffs.

In the limestone there are often great caverns opening to the hill slopes. They are due to underground water, which slowly dissolves this kind of rock, making long winding channels within it.

The cave of Ingleborough has been traced for

half a mile. From its top hang beautiful pendants, pillars rise from the floor, and large flat sheets of limestone hang like stony banners from the walls. A little rivulet flows through the centre, and the great chambers are connected by low, narrow passages. White rats live in these caverns.

You should obtain some pieces of the stones mentioned in this chapter—slate, sandstone, and limestone. You can scratch limestone with a pen-knife, but you cannot really scratch sandstone, though you may chip it away.

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FIG. 46.—BAMBURGH CASTLE

CHAPTER XIII. THE BORDER

THE district midway through Great Britain, where the kingdoms of England and Scotland meet, is known as the Border. In the old times it was a wild region with few inhabitants, and those few were mostly gathered into castles and walled towns. There were constant feuds and enmities between the people who dwelt north and south of the boundary.

The frontier begins in the west at the head of Solway Firth. Here there was formerly a marsh, known as Solway Moss, which has now been

drained. The frontier crossed this marsh, and then ran up into the Cheviot Hills, and northeastward along their crest, until they come sud-

FIG. 47.—THE BORDER.

If the sea rose 600 feet there would be a strait through the Tyne Gap, but the Cheviot would still be 2,000 feet high.

denly to an end in a great domed hill, known as the Cheviot, visible far out on the North Sea.

From this hill the frontier turns northward to the river Tweed, and then follows the Tweed

north-eastward almost to its mouth. But the town of Berwick, on the left or Scottish bank, belongs to England.

The left bank of a river is that to your left hand, when you look down the river in the direction of the sea.

The Cheviot Hills are a broad belt of high bleak moorlands, which rise eastward into the great dome, nearly three thousand feet high, which has just been mentioned. In springtime the passengers on the coasting steamers, which ply from London and Newcastle to Leith and Aberdeen, see it capped with snow. It is then a striking mark of the border between the two kingdoms.

If you look carefully at Fig. 47, you will see that there is a space, about ten miles broad, between the foot of the Cheviots and the sea coast. This is the chief gateway of Scotland. The county of Northumberland here extends northward between the hills and the sea as far as the Tweed.

People in England often refer to Scotland as "North of the Tweed," and in Scotland people speak of England as "South of the Tweed." The map, however, shows you that the Tweed is the boundary between the two countries only for a short distance. How is it then that we describe Scotland as lying beyond the Tweed?

It is because men naturally avoided the high Cheviot Hills, and passed through the gateway of low ground beside the North Sea. Nine out of

every ten people who went to Scotland in the old days went by the east coast, and therefore crossed the Tweed.

The ancient walled town of Berwick was captured by England, and was held as a fortress to protect the north end of the bridge over the Tweed. On Fig. 83, p. 144, you will see that there

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FIG. 48.—THE WALLS OF BERWICK-ON-TWEED.

is a county called Berwickshire, which lost its county town when Berwick-on-Tweed was taken by England.

On the coast of Northumberland, just east of the Cheviots, there stands the old castle of Bamburgh, where was once the capital of the Kingdom of Northumbria. That was before the Kingdoms of England and Scotland had been founded.

Northumbria spread along the east coast northward from the Humber, as its name tells you. It ended on the Forth, just beyond Edinburgh. Bamburgh, the capital, stood nearly midway from the Humber to the Forth.

In later times the counties of Yorkshire and Durham were formed out of the southern part of the Northumbrian kingdom, and several counties of Scotland were formed from its northern part. The county of Northumberland was thus all that

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FIG. 49.—THE ROMAN WALL.

remained, but it has kept the old name, although it lies a long way from the Humber.

Close by Bamburgh are some small islands. One of them is known as Holy Island, because a famous Scottish missionary dwelt there while he was converting the Northumbrians to Christianity. Near by are the Farne Islands, where lived Grace Darling, whose name was heard all over Britain

eighty years ago. She was the daughter of the lighthouse keeper, and in a stormy sea rowed a boat out and rescued a shipwrecked crew.

Many battles have been fought near the east coast where it passes from England to Scotland. At the northern foot of the Cheviots, a short way from the Tweed, is the battlefield of Flodden. Here the King of Scotland and the chief of his nobility were slain by the English. The disaster is described by Sir Walter Scott in "Marmion."

> Tradition, legend, tune and song,
> Shall many an age that wail prolong;
> Still from the sire the son shall hear
> Of the stern strife, and carnage drear,
> Of Flodden's fatal field,
> When shivered was fair Scotland's spear,
> And broken was her shield!

Another celebrated battle was fought in these parts many years earlier than Flodden. It was at Otterburn, on the south slope of the Cheviots, where they descend gradually towards the Tyne. Here a pass, called Carter Bar, leads over the top of the hills from the dale of the Teviot, a Scottish tributary of the Tweed.

At Otterburn the Scots under Douglas, who was killed, defeated the English under Hotspur, who was taken prisoner. The story of this fight is told in the famous ballad of "Chevy Chase," which means Cheviot Forest.

Of twenty hundred Scottish spears
Scarce fifty-five did flie.
Of fifteen hundred Englishmen
Went home but fifty-three;
The rest were slain in Chevy Chase
Under the greenwood tree.

Between the Cheviots and the northern end of the Pennine Range there is a deep passage known as the Tyne Gap. We read of it in the last chapter. To north and to south the moors rise to heights of two and three thousand feet, but the road and the railway from Newcastle to Carlisle lead through the Gap, at an elevation of not much more than four hundred feet.

The Tyne Gap is a very deep notch in the backbone of England, and Newcastle and Carlisle have long been important towns, because they stand at the two ends of the road which crosses the island through the Gap.

The Roman Wall runs across Great Britain immediately north of the Tyne Gap. It was built by the Romans, when they held England, for a barrier against the wild Caledonians of Scotland. It was built just here because Great Britain is only a little more than sixty miles across from the mouth of the Tyne to the head of Solway Firth.

Let us take the straight edge of a piece of paper, and let us find out from Fig. 83 if there is any place where the island is again as narrow as it is here at the Border between England and Scotland.

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FIG. 50.—THE RUINS OF MELROSE ABBEY.

CHAPTER XIV. THE SOUTHERN UPLANDS OF SCOTLAND

LET us take a straight edge of paper, and lay it across the south of Scotland in a north-easterly direction. Let us mark off and measure the distance from Port Patrick to St. Abb's Head. This we may do on Plate VI. We shall find that the distance is very nearly the same as the length of the Pennine Range on Fig. 27. From the North Channel to the North Sea extends a broad belt of green hills, which are known as the Southern

FIG. 51.—SOUTHERN SCOTLAND, PHYSICAL.

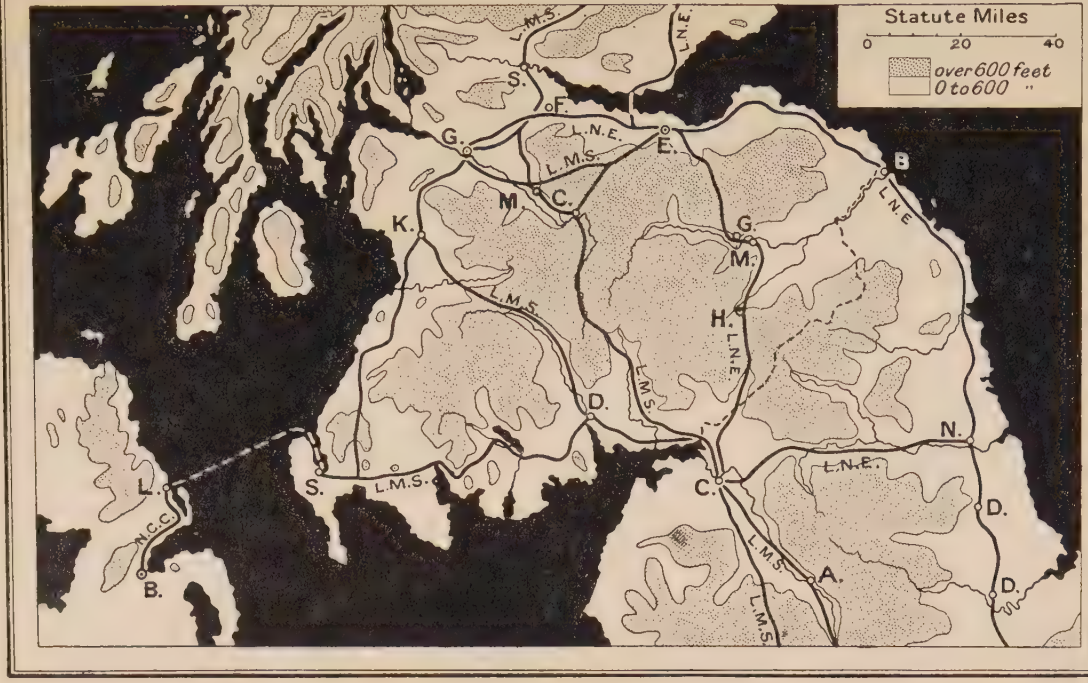

FIG. 52.—SOUTHERN SCOTLAND, RAILWAYS.

Uplands of Scotland. Several million sheep live upon the mountain pastures and in the winding valleys of these Uplands.

The Cheviot Hills are a branch of the Southern Uplands. They run eastward from the Lowther Hills, the central group of the Southern Uplands. Between the Cheviots and the main range is the broad dale of the Teviot, a tributary of the Tweed. But the most important rivers of the Southern Uplands are the Tweed itself and the Nith.

The Tweed flows eastward to Berwick-on-Tweed. Down in its valley, about the middle of its course, is the Abbey of Melrose, perhaps the most beautiful ruin in Britain. Close at hand is Abbotsford, the home of Sir Walter Scott. It was he who wrote—

> If thou would'st view fair Melrose aright,
> Go visit it by the pale moonlight ;
> For the gay beams of lightsome day
> Gild, but to flout, the ruins grey.

There are manufacturing towns beside the Tweed and its tributaries—Galashiels, Hawick, Selkirk, and Peebles. In these towns the wool of the hills is woven into the famous cloths, known the world over as tweeds.

The Nith rises on the north slope of the Uplands, and then, bending southward, flows completely through them in a deep valley. Passing the town of Dumfries, it empties itself into Solway Firth.

Thus the Southern Uplands are trenched right through by the valley of the Nith, which is known as Nithsdale.

The chief town of south-western Scotland is Dumfries, placed where the road from Carlisle bridges the Nith and then branches into two roads. One of these roads runs northward to Glasgow through Nithsdale. The other follows the southern foot of the Uplands into Galloway. At the end of Galloway is the curious hammer-shaped peninsula known as the Rhinns of Galloway. Here the mountains of Ireland are in sight across the North Channel. Steamers cross from Stranraer to Ireland, carrying passengers from London by way of Carlisle and Dumfries, and also passengers from Glasgow.

When we last saw our foreign friend, we left him on the top of Cross Fell. Let him return to Newcastle for his car, and come through the Tyne Gap to Carlisle. We will advise him then to run northward up Annandale.

The main line of the L.M.S. Railway goes up Annandale to the pass of Beattock. You will remember that the west coast expresses from London must climb to the top of Shap Fell, a height of a thousand feet, in order to pass from Lancashire into Cumberland. In Scotland, at the pass of Beattock, they again rise to a thousand feet, before they descend into the head of Clydesdale. Down in the Scottish Lowland they are often divided at Carstairs Junction, the one part

running north-eastward to Edinburgh, and the other north-westward to Glasgow.

Close beside Beattock is the green flat summit of Hart Fell, twenty-six hundred feet high, in which is the source of the Tweed. Let us propose to our traveller that he break his journey at Beattock, and that he climb Hart Fell. If the day be clear, he will look southward across Solway Firth to the peak of Skiddaw in the Lake District, and he will see far away in the north-west, across all the busy lowland of central Scotland, the high peak of Ben Lomond. Measure these distances. You will then know how large a part of Great Britain may sometimes be seen from a single hill.

Close to Beattock is a village called Leadhills, at a height of fifteen hundred feet, in a most bleak and exposed situation. It is said to be the highest permanently inhabited spot in Great Britain. A few huts of shepherds and game-keepers in the Northern Highlands may stand at a greater elevation, but they are not occupied all the year round.

Now let us try to print upon our memories the map of the hills which fill northern England and southern Scotland. Draw an outline of the coasts of the central portion of Great Britain. Take a pencil, and shade over all the district covered by the Southern Uplands of Scotland, being careful to give them sufficient breadth. Leave a

narrow space unshaded where Nithsdale cuts its way from north-west to south-east. Be careful also to leave unshaded the lower valley of the Tweed and the valley of the Teviot, so that the Cheviot Hills may be seen to branch eastward from the main belt of the Southern Uplands.

Now carry your shading over the length and breadth of the Cheviot Hills, the Pennine Chain, and the Cumbrian Group. The shading will, of course, cover Shap Fell, and so connect the Pennines and the Cumbrian Mountains. Leave a passage unshaded across the Pennine Chain where the Aire Gap comes through from east to west, making a natural way from Yorkshire into Lancashire. Lastly, be very careful to leave the Eden Valley unshaded, and above all the deep passage at the Tyne Gap.

When you have done all this, try to think what the land would look like if clouds filled the valleys and covered the lowlands. White cloud would fill the space over Solway Firth, and narrow bands of cloud would extend through Nithsdale, through the Tyne Gap, and up the Eden Valley. Cloud would cover all the centre of Scotland and all the seas around, and a thread of cloud would mark the Aire Gap. In the south, the Peak of Derbyshire would stand out like a great promontory, in the midst of a rolling sea of fleecy cloud covering the Midlands of England.

The broad moorlands of the south of Scotland and the north of England would rise above the

clouds, like a group of islands separated by narrow straits. They would be islands without hedges and almost without trees. Sheep and grouse would be their most numerous inhabitants. Nearly all the wealth and activity of men would be down beneath the clouds, in the valleys, on the lowlands, and along the coasts.

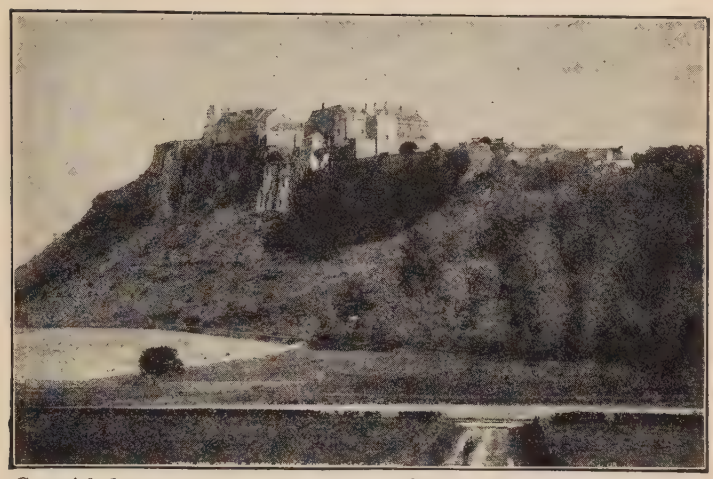

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FIG. 53.—STIRLING CASTLE.

CHAPTER XV. THE GRAMPIANS

SCOTLAND consists of three parts, the South, the Centre, and the North. The South and the North are mountainous, but the Centre lies low, as you may see on Figs. 51 and 60.

In the South, towards the English border, are the Southern Uplands, chiefly inhabited by sheep and their shepherds. The Centre contains the two great cities, Edinburgh and Glasgow. In the North are the Highlands, even more thinly peopled than the Southern Uplands, and wilder and more beautiful.

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FIG. 54.—VIEW FROM STIRLING CASTLE.

Let us leave the Centre of Scotland till last, and let us cross now from the Southern Uplands to the Highlands. We will ask our foreign friend to come with us to the old town of Stirling, and having left his baggage at the inn, to walk in the evening to the castle, which crowns a rocky crag, and to look out northward from its ramparts. If he is lucky in the matter of weather, he will see one of the finest views in all Britain.

Below him, at the foot of the castle rock, beyond some corn fields, are the bends or "links" of the river Forth, shining in the midst of the plain. On the horizon, in front of him, is what looks like a range of mountains. Far away in the west, standing out against the brilliant evening sky, he notes the peak of Ben Lomond, which he saw from the top of Hart Fell.

The mountains which close in the view from Stirling Castle are often described as the Grampians. They are not, however, really a mountain range, but the steep craggy edge of a great tableland, which fills nearly all the north of Scotland. This tableland is known as the Highlands.

Turn to Fig. 60, p. 105, and find the town of Helensburgh on the west coast, near the mouth of the Clyde. Then find the town of Stonehaven on the east coast, lying much farther north than Helensburgh. Place the straight edge of a sheet of paper across Scotland from Helensburgh to Stonehaven. The line so found marks the edge

of the Highlands. Measure its length by means of the scale on the map.

The Highland Plateau rises higher than the Southern Uplands and the Pennine Moorlands, and is broader and altogether more massive. The west winds from the Atlantic bring to it plentiful rain and deep snow. Therefore many rivers have their sources in the heart of it, and flow through deep winding valleys outward to the low ground and the coast. These Highland valleys are called glens.

You must think, therefore, of the Highlands as a vast uneven slab of rock, whose Grampian edge overlooks the Central Lowlands. Notched into the surface of the slab are many narrow and deep glens. Treeless moors spread over the broad tops, but the glen-sides are often wooded. The rapid torrents in the glen-bottoms expand here and there into long narrow lakes. The glens, therefore, are the most beautiful parts of the Highland country.

If you look at the large county of Perthshire, you will see that all its glens gather together to form the Tay, the largest river in Scotland. Perthshire very nearly coincides with the basin of the Tay, just as we saw that Yorkshire nearly coincides with the basin of the Ouse.

The Tay emerges from the Highlands at Dunkeld, which is placed on the line between Stonehaven and Helensburgh. After Dunkeld, outside the Highlands, the river winds past the city

FIG. 55.—PERTHSHIRE.

of Perth, down in the lower country. It enters the North Sea by a great tidal estuary, the Firth of Tay, upon which stands the port of Dundee. The Tay brings down more water than any other river in Britain, but its sources are high in the mountains, and it flows too rapidly to be navigable above the tideway.

If you look at that part of the Tay basin which lies within the Highlands, you will see a long lake called Loch Tay. This lake lies less than 300 feet above the sea, but on either hand are the steep sides of the glen, rising to heights of nearly 4,000 feet. So deeply is Glen Tay cut into the Highland mass! If you climb the slope to north of the loch, you will stand at last on the summit of Ben Lawers, and on all sides you will see the rolling heathery Highlands. Here and there a pointed peak stands up from the more rounded outlines.

Look again at Fig. 60, and see how the Grampian Highlands, shown grey on the map, extend north-eastward into a great shoulder of land, which is thrust forward into the North Sea. This promontory is known as Buchan, and one of its capes is Buchan Ness. Towards the end of it the Highlands sink to lower ground, shown white on the map.

See how the rivers flow from the centre of the Highlands south-eastward, eastward, and north-eastward to the sea round Buchan. The main course of the Tay is south-eastward; the courses

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FIG. 56.—BALMORAL CASTLE.

of the Spey and the Findhorn are north-eastward; while the Don and the Dee flow eastward. The King's castle of Balmoral is in the glen of the Dee, and the great port of Aberdeen at its mouth.

The promontory of Buchan is not very unlike the promontory of Cumberland, between Solway

Fig. 57.—Red Deer.

Firth and the Irish Sea. There also the dales and the lakes run outward to the sea from the higher ground in the centre.

In the midst of the Highlands, where the rivers have their sources, is the most important group of heights in all the British Isles. The loftiest among them is Ben Macdhui, and others nearly as high are Cairn Gorm and Cairn Toul.

There is a single point elsewhere in Scotland,

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Ben Nevis, which is a little higher, but no such group of summits. Through half the year they are thickly covered with snow, but in the late summer they become brilliant with purple heather. Here is the home of the red deer, and the grouse, and the golden eagle.

Another summit close at hand is Lochnagar, on which Byron wrote the following lines :—

> England ! thy beauties are tame and domestic
> To one who has roved on the mountains afar !
> Oh ! for the crags that are wild and majestic !
> The steep frowning glories of dark Lochnagar.

Fig 58.—A Golden Eagle.

CHAPTER XVI. THE HIGHLANDS

Has it struck you that the Highland names in the last chapter are different from the names of the Southern Uplands and the Pennines? In the Highlands a deep valley is called Glen, not Dale; a mountain is called Ben, not Fell; and a lake is called Loch, not Mere. Thus in the Highlands we have Glen Tay, Ben Lomond, and Loch Tay, but farther south we have Nithsdale, and Sca Fell, and Windermere.

The reason is that the people who live in the Highlands are of a different race, and speak a different language, from those who live in the south of Scotland and the north of England. The Highlanders are Celts, and their language is Gaelic. They named their hills and lakes for themselves, and when English-speakers first travelled among them, and asked "What do you call this mountain?" or "What do you call that lake?" they answered in Gaelic.

The Highland tribes were known as clans. Over each clan there ruled a chief. All the people of a clan had the same surname, which often began with Mac. Thus the MacDonalds, the

MacLeods, and the MacKinnons were three of the clans.

The Highlanders wore a different dress from the Lowlanders, more suited to the climbing of rough hills, through bog and snow. The kilt and the plaid were parts of their dress, and were made of cloth woven into patterns. Each clan had its own pattern or tartan.

The main wealth of the Highlands consists of rough shaggy cattle, which the Highlanders drive down the glens to sell to the English-speaking Lowlanders.

In former times the Highlanders often raided the cultivated plains, and then withdrew to their mountains, through whose glens there were no roads. When the Lowlanders went to punish them, they were often ambushed in the glens.

No one can look at the map of Scotland without noticing a line of narrow lochs crossing the Highlands from south-west to north-east. The line is so straight that it looks as though it might have been cut with a knife. These lochs are along the bottom of Glenmore, a word which means in Gaelic the "Great Glen." The Highlands are so deeply trenched by Glenmore that they are severed into two parts. The Grampian Highlands are to the south-east, and the Northern Highlands to the north-west.

The lochs of Glenmore have been chained together by short canals, and a waterway has been formed from sea to sea. It is known as the

FIG. 59.—NORTHERN SCOTLAND, RAILWAYS.

FIG. 60.—NORTHERN SCOTLAND, PHYSICAL.

Caledonian Canal, and allows small ships to go from the Atlantic to the North Sea, so avoiding the stormy passage round the north of Scotland. Caledonia was the Latin name for the Scottish Highlands.

The longest loch in Glenmore is Loch Ness, which drains north-eastward by the short river Ness. Let us measure the length of the Great Glen from Fort William to Inverness, which means "at the mouth of the Ness."

Along their western edge the Highlands present to the Atlantic a front of great cliffs, which jut out into the ocean, forming long promontories. It is therefore not possible to make a road northward along this coast, and most of the traffic is done on the water from Glasgow, and from the three or four points where railways come through the Highlands to the western sea.

On the east coast the Highlands drop to a strip of low plain along the shore. Therefore there is room here for a road northward from Edinburgh.

Do you remember the strip of plain which our foreign traveller saw from Stirling Castle spreading away to the foot of the Grampians? That strip is known as Strathmore, or the Great Strath, to distinguish it from Glenmore, the Great Glen. The word "strath" signifies a broad flat-bottomed valley, whereas a glen is narrow.

Strathmore extends north-eastward in front of the Grampians to the coast near Stonehaven, and

the old railway from Edinburgh ran through it, as you may see from Fig. 59, p. 104. It ran round the heads of the Firths of Forth and Tay. The bridges were at Stirling and Perth. But the most direct railway now crosses the firths from Edinburgh to Dundee by two of the grandest bridges in the world, the Forth Bridge and the Tay Bridge. You will find a picture of the Forth Bridge as the frontispiece of this book.

Near Stonehaven the Highlands come close to the sea, and leave only just room for the road and the railway northward. Beyond Aberdeen the coastal plain spreads out again, and occupies the broad promontory of Buchan, a well-cultivated district with a considerable population. Here the railway is carried inland along the edge of the Highlands, direct from Aberdeen to Banff.

A strip of lowland, from five to ten miles broad, known as Moray, extends from Banff westward along the coast to Inverness. Therefore Moray Firth is the name of the great arm of the North Sea between the headlands of Buchan and Caithness.

Beyond Inverness the land stands forward again in the promontory of Caithness, which is like Buchan in outline, but smaller. Caithness is comparatively low, and there are some low peninsulas along the coast near Inverness. All these facts you may learn from Fig. 60 by paying attention to the tinting and the white.

The low country along the east coast is made

for the most part of red sandstone, which breaks up into fertile soil, whereas both the Grampian and the Northern Highlands are made of hard schists and slates. Schist is a rock not unlike slate, but harder and crumpled.

Most of the agricultural population of the north of Scotland is therefore gathered along the east coast, and the chief market towns are there. As you will see on the map, the towns are usually at the mouths of the rivers, so that the Highlanders may come down to them from the glens, and shipping may enter from the sea.

There are two towns in the north larger than the rest, Inverness and Aberdeen. Why have these places grown more than the other towns in their neighbourhood ?

Inverness is at the point where the road and the canal through Glenmore meet the coast road from Caithness. The "Highland" line of the London, Midland and Scottish Railway was carried at a great cost from Inverness to Perth through the Highlands, but until that was done the only railway to the south led from Inverness along the Moray coast to Banff and Aberdeen.

Aberdeen also stands at a gathering of ways. They come down the glens of the Dee and the Don, and from Inverness through Banff, and from all the low country of Buchan. But there is only one way by land from Aberdeen southward. It is nipped at Stonehaven between the Highlands and the sea. The name Aberdeen means "at

the mouth of the Dee," for there are two Celtic words meaning mouth, Inver and Aber.

Have you ever noticed that there is often a blacksmith's shop where two roads cross in the country? The smith finds that he has more horses to shoe from two roads than from one. So it is with other businesses. Many ways join together at Inverness and Aberdeen, and therefore these places have grown to be large towns. Moreover they are seaports.

Fig. 61.—Viking or Norse Ships.

CHAPTER XVII. THE NORTHERN AND WESTERN ISLES

In the far north-west of Scotland a lofty cliff stands sharply up from the ocean, like the prow of a great ship. It is made of hard dark rock, and the waves beat at its foot, and the wild seabirds fly on its face in their thousands and nest on its ledges. This headland is called Cape Wrath.

At first you would think that the name was

given because of the stern strength of the rock, or because of the anger of the storms. But that is not what the word means, for it is not an English word. Cape Wrath was named by the pirates who long ago infested all these seas.

These pirates were Norsemen—or North men—and they came from Norway. They took possession of the Shetland and Orkney Islands to the north of Scotland. Then they passed round Cape Wrath and seized the Western Isles, which are called the Hebrides. They even passed through St. Patrick's Channel and captured the Isle of Man in the midst of the Irish Sea.

In the language of the Norsemen, which was very like the language spoken by the Norwegians to-day, the word Wrath meant a corner. Cape Wrath stands where ships coming westward from Norway turned southward.

The first islands to which the Norsemen came were the Shetlands, in the entry to the North Sea, like a stepping-stone between Norway and Scotland (*Fig.* 6, *p.* 9). There are over a hundred Shetland Islands. Some thirty-two of them are inhabited. The largest is known as Mainland. It is sixty miles long and over twenty miles wide, but its coast is so cut by deep fiords that no part of it is more than three miles from the shore.

Inland the Shetlands are dreary and desolate, but their promontories tower grandly over the stormy sea, with summits lost in the mist, and innumerable caverns along the shore. They have

been well described as the skeleton of a departed land. The softer rocks have been washed away,

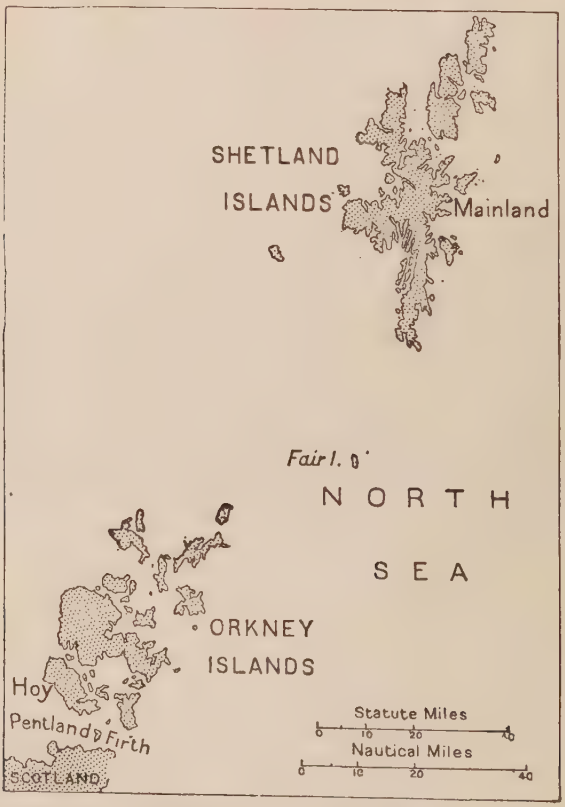

Fig. 62.—The Orkney and Shetland Islands.

and only the harder rocks have withstood the fury of the Atlantic waves.

The Shetlands are famous for a race of small shaggy ponies, so hardy that they can live on the hills through the winter storms. The people

speak English, not Gaelic. They are descendants of the Norsemen, not of the Celtic Highlanders.

Midway between the Orkney and the Shetland Isles is a lonely rock called Fair Island. Upon this rock the Admiral of the Spanish Armada was wrecked.

The Armada came from Spain, as you will

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FIG. 63.—SHETLAND PONIES.

remember from Chapter II. It sailed up the English Channel in order to convey a Spanish army from Belgium for the invasion of England. But the Armada was defeated in the Strait of Dover, and fled through the North Sea, and round the north of Scotland and the west of Ireland. It lost ships by wreck all the way, so that very few indeed ever returned to Spain.

Unlike the Shetlands, the Orkney Islands are low. They are separated from Scotland by the stormy Pentland Firth. They are made of the same red sandstone that is so frequent along the low east coast of Scotland, whereas the Shetlands consist of the hard rocks which compose the Highlands.

But one of the Orkneys, named Hoy, contains a lofty crag, called the Old Man of Hoy. This crag is pierced at its base by an arch, which is due to the ceaseless wearing of the waves.

On the other side of Cape Wrath, along the west of the Highlands, Scotland is fringed for more than two hundred miles with promontories and peninsulas. There are hundreds of islands scattered over the neighbouring sea.

These islands are the Hebrides, and are in two groups. The Inner Hebrides lie somewhat to the south, and close to the mainland. The Outer Hebrides form a chain, more than a hundred miles long, which is divided from Scotland and from the Inner Hebrides by the Minch. The straits separating the Outer Hebrides are narrow, and the whole chain of islands is often spoken of as Long Island, as though it were a single land.

The Outer Hebrides act as a great breakwater, protecting the west coast of Scotland from the worst strength of the Atlantic billows. Such are the gales to which these islands are

exposed, that there are no trees, even in the valleys, except at one or two points.

Far out of sight of other lands, to west of the Outer Hebrides, lies the solitary St. Kilda, once the most lonesome of the inhabited British Isles. It consists of three islets, surrounded by ten or twelve " stacks " of rock, which are very nearly vertical, and hardly to be approached except by sea fowl.

Until recently there were about fifty people living on St. Kilda, who were visited occasionally by a steamer from Glasgow; the men being bird-catchers and the women weavers. but they were removed to the mainland in 1930. The sheep of St. Kilda are of a kind not found anywhere else in the world. They are the last of a species which was common in England in the time of the ancient Britons.

Remoter still, nearly two hundred miles westward of St. Kilda, Rockall rises from the surface of the great ocean to a height of seventy-five feet, with a circuit of only a hundred yards. It is one of the loneliest islets in the world. When seen from a distance it resembles a ship in full sail, for the upper part of the rock is vividly white, and the lower part is grey, like the hull of a vessel. Rockall is visited at long intervals by ships engaged in the cod fishery.

Of all the western isles the deepest interest attaches to the small islet of Iona, placed in the midst of the Inner Hebrides, just where the Firth of Lorne forms the entry to Glenmore. Iona was

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FIG. 64.—NORTH SEA FISHING FLEET LEAVING STORNOWAY.

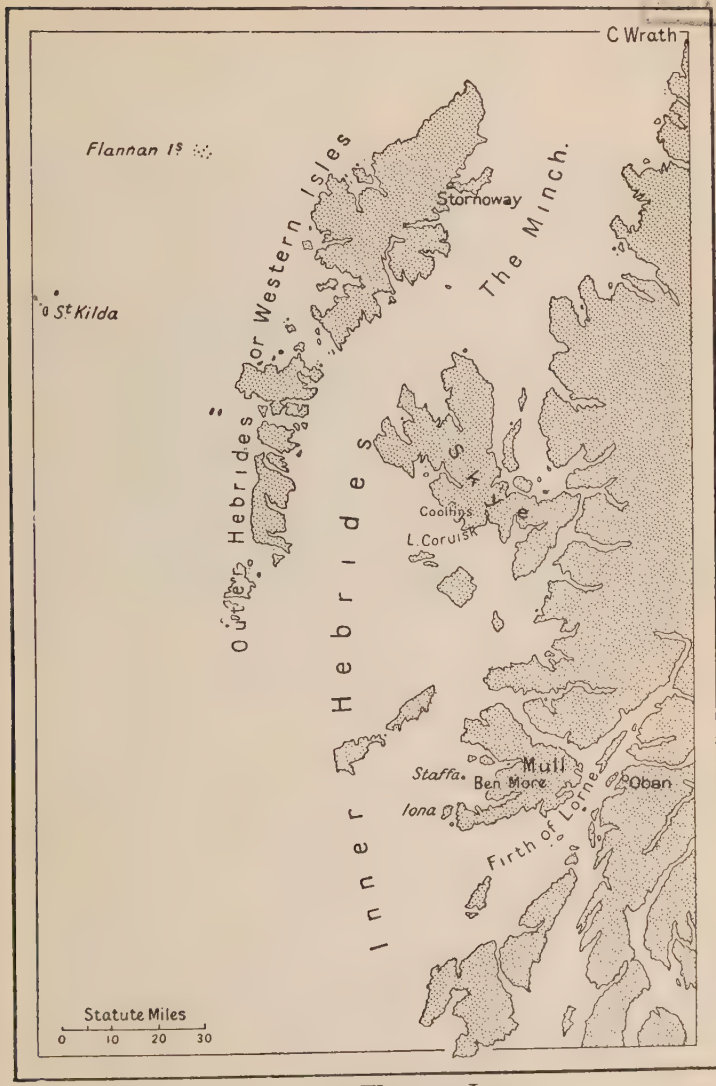

FIG. 65.—THE WESTERN ISLES.

Measure the length of Long Island.

the home of Columba, the Irish monk who brought Christianity to Scotland. It has a most interesting cathedral. The monastery which

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FIG. 66.—THE RUINS OF IONA CATHEDRAL.

The Cathedral has lately been restored. Across the Strait is the Island of Mull (*see Fig.* 65).

Columba founded was again and again burnt, and the monks slain, in the wild time when the Norse pirates were fighting with the Celtic clans.

[Look at the map on p. 112. Do you see the broad space of water, just east of the Island of Hoy, which is enclosed by the Orkney Islands? That is the secure harbour called Scapa Flow, from which our Fleet sallied forth on to the North Sea during the Great War. Henceforth Scapa Flow will be a very famous name in our history.]

CHAPTER XVIII. STAFFA AND THE GIANTS' CAUSEWAY

We have all heard of the wonderful mountains called volcanoes. There are many of them in the distant parts of the earth, but fortunately for us there are none in the British Isles.

At the top of a volcano there is a great pit, which is called the crater. In the bottom of the crater there is a hole, which goes down through the centre of the mountain far into the rocks beneath; no one knows quite how far. We do know, however, that it goes down into depths of the earth which are very hot, because melted rock, shining like fire, wells up at times into the crater.

This liquid rock is called lava. Great jets of steam rise from its surface, and hang like a storm cloud over the summit of the mountain. There are constant flashes of lightning, and at night the clouds reflect magnificently the glare from the crater below. Sometimes the lava boils over, and a great river of it flows down the side of the mountain, and over the neighbouring country, destroying everything which lies in its path.

Men have often described volcanoes as burning

mountains, but this is wrong. The clouds are of steam and not of smoke, as they would be if the mountain were on fire.

In long past ages there were volcanic eruptions

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FIG. 67.—FUJIYAMA, A FAMOUS VOLCANO IN JAPAN, 12,000 FEET HIGH.

Note the conical shape of the mountain, and the flat top where is the crater.

on a very grand scale. Great cracks opened in the ground, and the lava poured out of them. It was so hot, and so liquid, that it did not pile up into a heap with a crater at the top, like the volcanic mountains of the present time. It drowned the whole country as though under a

flood. Gradually the flood cooled and became a sheet of solid rock, covering the land, filling the valleys, and in places driving out the sea.

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FIG. 68.—AN ERUPTION OF MOUNT PELÉE, A WEST INDIAN VOLCANO, SEEN FROM THE SEA.

The clouds of steam are several miles high.

The surface of the lava plain formed a great tableland.

Although there are no volcanoes in the British Isles to-day, there were once great volcanoes here. In the west of Scotland and the north of Ireland cracks opened in the ground, like those

just described. The lava welled up through them, and hardened in vast sheets, several thousand feet thick and many miles wide. This was before men came to live in our islands.

The lava filled the Minch, between the Outer Hebrides and the Northern Highlands, and it

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FIG. 69.—LOCH CORUISK. (Pronounced Coroosk.)

spread southward as far as Lough Neagh, in the north-east of Ireland.

As you may see on Fig. 83, p. 144, Lough Neagh lies almost due south of the Minch. If you want to learn how vast was the region covered by the liquid rock, you should measure on the map the distance from the Minch to Lough Neagh.

All this happened long ages ago, and the wind and the rain have been at work ever since. The

fierce winds of the Atlantic have driven the storm waves against the edge of the lava plateau. The winter frosts have splintered its surface, and the rain torrents have carried the debris down into the sea. There it has settled as sand on the bottom of the ocean.

So it has come about that to-day the great

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FIG. 70.—THE COOLIN MOUNTAINS OF SKYE.

tableland of lava has been reduced to mere fragments. Most of these fragments are now islands. The chief of them are Skye and Mull the largest of the Inner Hebrides. The whole of Mull, and nearly the whole of Skye are formed of volcanic rock.

On the south side of the island of Skye you

will find a sea-loch called Loch Scavaig. The word loch is used in Western Scotland not only for a fresh-water lake, but also for a narrow arm of the sea.

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FIG. 71.—COLUMNAR BASALT.

Close by is Loch Coruisk, a fresh-water loch, which has perhaps the grandest view in all Britain, and in bad weather the sternest. The Coolin mountains tower from the shore into jagged peaks, more than three thousand feet high. In the damp Atlantic air their steep slopes are dark with moss and lichens, but silvery cascades leap down their sides and

gleam in the sunshine. In other parts of Scotland there are higher mountains, but they do not rise sheer from the sea-level.

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FIG. 72.—THE GIANTS' CAUSEWAY.

The highest mountain in Mull is Ben More. This is a Gaelic name, like Glenmore and Strathmore. It means "Great Mountain." Ben More is over three thousand feet high. It is a pyramid of dark lava rock, of the kind which is called basalt. The beds of basalt lie flat upon one another, like the courses of brick in a wall.

The piece of basalt at the very top of Ben More is the last remnant of a great sheet of lava rock, which once extended like a level pavement for miles and miles in every direction.

Try to picture to yourself a solid plain at a level half a mile above the present sea. Then try to think how the wind, and the frost, and the rain, and the waves have gradually pulled this high plain down, so that there is left only a pointed heap. But the heap is so large that it is the mountain Ben More in the island of Mull.

Let us go near to one of the cliffs of basalt among the Western Isles. It looks like the edge of a great dark honeycomb. The rock lies flat, in thick slabs, tier above tier. Each slab may be fifty or a hundred feet thick, but it is split into columns, standing side by side. Each column has six sides, just like the cells of a honeycomb. In some places you may see these columns ranged side by side, and row above row, over all the face of the cliff.

There are two very celebrated spots to which tourists go to see this wonderful natural architecture. In the north-east of Ireland there is a spot on the coast, in the county of Antrim, which is called the Giants' Causeway. The word "causeway" means a pavement, raised a little above the ground, so as to give a dry path. In the Giants' Causeway the tops of the basaltic columns form such a pavement beside the sea. The people of Ireland tell many stories of ancient giants, and

they used to say that the Causeway was built by the giants.

Even more wonderful is the islet of Staffa, which rises out of the sea just to the west of Mull. The waves have broken great caverns into its columnar basaltic cliffs. Most famous of these is the Cave of Fingal, which can only be reached in a boat. It is walled on each side by columns supporting a ceiling of rock. It is over a hundred and twenty yards long. Above, in twilight gloom, it is like a great cathedral built by hands. But at high tide it is floored with water, through which the echoing breakers surge. Its Gaelic name means the Cave of Music, because the roar of the ocean surf, driving into the cavern, resounds with the changing tones of a great organ.

How have these beds of columnar rock been formed ? Have you ever noticed that when mud dries in the sun, along the edge of a pond, or along the banks of a river when the tide is out, it cracks in all directions ? The cracks cross one another, so that the mud is divided into a number of slabs of irregular outline.

Now if you think of it, each of these slabs must be the top of a column of mud, because the cracks run downward into the mud. Therefore the whole mass of mud must consist of columns placed side by side. You could push the blade of a pocket-knife into the cracks between them.

So it was with the hot liquid lava. As it cooled, it shrank and cracked, exactly as mud does when

it dries in the heat of the sun. But the lava was so perfectly liquid, and so evenly mixed, that the cracks ran through it in straight lines, instead of being irregular like those of mud. So the lava hardened into rock columns, each with six sides.

This marvellous history has gradually been learned by careful examination of the rocks. The men whose business it is to study the rocks are called geologists. If you look at a house, and see the bricks and mortar of which it is made, you can picture to yourself the busy work of the builders. In like manner the geologist is able to picture the way in which the rocks were built up, and how they were afterwards sculptured into beautiful scenery.

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FIG. 73.—FINGAL'S CAVE, STAFFA.

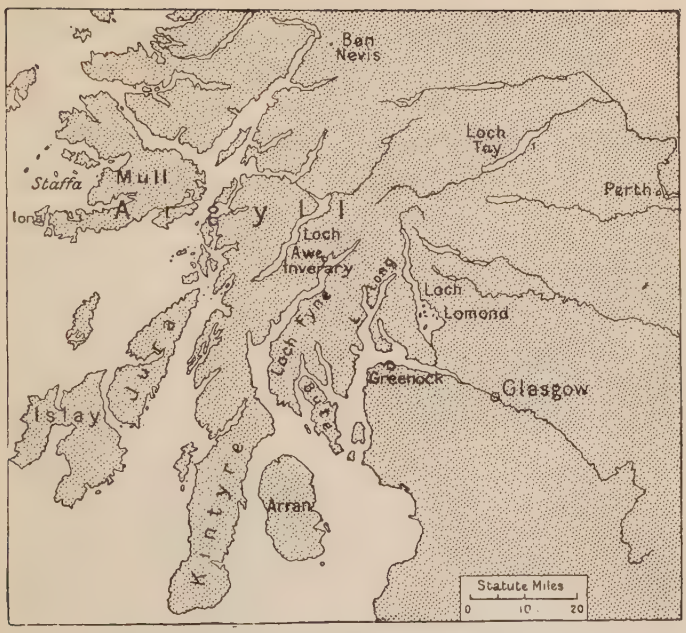

FIG. 74.—ARGYLLSHIRE.

CHAPTER XIX. THE LOCHS OF ARGYLL

LOOK at the large county of Argyll on the map of Scotland. It is the south-western county of the Highlands. What an extraordinary outline it has! What a great length of coast! It is wholly made of mountainous islands and peninsulas. Between the mountains are long deep

glens. Down in the glen-bottoms are long narrow lochs. Some of these lochs are filled with fresh water, like Loch Awe, but some are sea-lochs, like Loch Fyne.

Compare Argyll with the promontory of Buchan on the other side of Scotland. How rounded and

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FIG. 75.—LOCH AILORT, A SEA-LOCH.

Another sea-loch is shown in Fig. 84, p. 146.

unbroken is the coastline of Buchan! There are no long lakes in Buchan. It is only when we come halfway across Scotland that we begin to find long lakes.

In ancient times the Highlands were known as Alban or Albany. Look at the two great Highland counties of Argyll and Perthshire. The boundary

between them runs from north to south. In the Gaelic language this boundary is known as Drumalban, which means the backbone or ridge of Alban.

Drumalban divides the eastward from the westward drainage. Long rivers flow eastward to the Tay and the Forth. Short torrents flow through the glens and lochs of Argyll to the western ocean.

What is the cause of the great difference between the Western Highlands and the Eastern Highlands? Why is the coastline so simple in the east, and so jagged in the west? Why are there so many lochs in the west, and so few in the east?

There are two reasons. The first is that more rain falls in the west than in the east, just as more rain falls in Lancashire than in Yorkshire, as we learned in Chapter XI. The second reason is that the slope from the mountains to the sea is steeper in the west. There is a plain along the east coast, but in the west the highest mountain in the British Isles, Ben Nevis, rises almost directly from the sea. Ben Nevis is 4,600 feet high.

Have you observed that after heavy rain the streams flow with muddy water? They are digging their beds deeper, and are carrying the mud down to the sea. That is how the deep glens have been made in the rainy west of Scotland. Not only is there much rain in the west, but the torrents run fast, because the high mountains are near to the coast.

But why are there lakes in the bottom of the glens ? Why do not the rivers and torrents drain the glens dry ? To answer this question we must

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FIG. 76.—GOSTEDAL GLACIER IN NORWAY.

go back a long way. We must go back to a time before men came to Scotland, but after the great outflow of hot lava.

The glens had already been worn deep by the torrents. Our climate was colder than it is now. The moisture from the Atlantic gathered on the heights in deep snow, and did not completely thaw even in the summer. The snow slipped down into the glens, and became ice. Long tongues of ice filled the glens, and moved slowly down them towards the sea. These ice-tongues are still

found in many parts of the world. They are known as glaciers.

How do we know that there were once glaciers in the Highland Glens ? We know it in this way. In many parts of Scotland, if you turn up the turf, you will find that the rock underneath is scratched. The rocks along the valley sides are scratched in precisely the same way in those parts of the world where they still have glaciers. The scratching of the Scottish rocks was done

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FIG. 77.—SVARTISEN GLACIER IN NORWAY.

by hard stones embedded in the ice of ancient glaciers.

Have you ever noticed a glazier cutting glass ? He scratches it with a hard diamond, which he

carries in a holder, shaped like a pencil. The glaciers scratched the rocks in the same way. Hard bits of stone got fixed in the ice, and were

By permission of] [*R. Kidston, Esq., F.R.S.*

FIG. 78.—ROCK AT STIRLING SMOOTHED AND SCRATCHED BY ICE.

carried along by it, scraping all the time against the bed of the valley.

The glaciers pressed unevenly as they slid down the glens. In some places they deepened the valley. In other places they piled up debris on the valley bottom. Thus when the climate improved, and the ice melted away, the glen bottoms were pitted with hollows in some places, and raised into hummocks in others. The torrents filled the hollows with rain-water. So the fresh water lochs were made in the glens.

Afterwards, the whole district of Argyll sank a little, though very, very slowly. The sea ran up into the glens, and in some places entered the lower ends of the lochs, and turned them into sea-lochs. Therefore we describe Argyll as a half-drowned country.

It is for this reason that the peninsula of Kintyre, and the island pairs of Islay and Jura, and Bute and Arran, stand out towards Ireland, side by side, in three chains. Once they were three ridges of mountain, with glens between them. Find Kintyre on the map, and the four islands, and make quite sure that you understand what the last three sentences mean.

The story which we have told in this chapter is very wonderful. In the rainy Atlantic weather the rocks were worn down by the torrents into ridges and glens. Then all Scotland became white and cold, and glaciers filled the western glens, and pushed out to sea. The ends of the glaciers broke off, piece by piece, and floated away on the ocean as icebergs. There are no icebergs now in the British seas.

Then the ice melted away, and the face of the country was again laid bare. The beds of the glens had been worn by the ice into hummocks and hollows, and the water gathered into the hollows, forming lochs. Finally the whole west of Scotland sank a little, very slowly. The rate of sinking was very likely only two or three inches in a man's lifetime. As the ground sank the

sea was able to flow into the valleys between the mountains, and the glens became sea-lochs. So

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FIG. 79.—AN ICEBERG.

the maze of straits and lochs was formed which we now see on the map of Argyll and the neighbouring parts of Scotland.

CHAPTER XX. THE BUSY HEART OF SCOTLAND

Between the two great slabs of high ground, the Southern Uplands and the Highlands, there is a trough of low country, which crosses the island from south-west to north-east. This lowland is less than a quarter of Scotland, but it contains nine-tenths of the population.

The ground is here formed of softer material than in the Highlands and Southern Uplands. Therefore the rains and streams have worn it down to a lower level, and have carried the debris into the seas on either hand. The climate also is milder than on the high ground.

This, therefore, is the district of Scotland in which there is most agriculture. The market towns have in consequence always been numerous and considerable, just as in the Vale of York.

The rivers descend into the Central Lowland from the heights to north and south. On the one hand, the Tay and the Forth come out of the Highlands, cross the lower agricultural ground, and empty themselves eastward into the North Sea. On the other hand, the Clyde flows north-westward from the Southern Uplands to the western ocean.

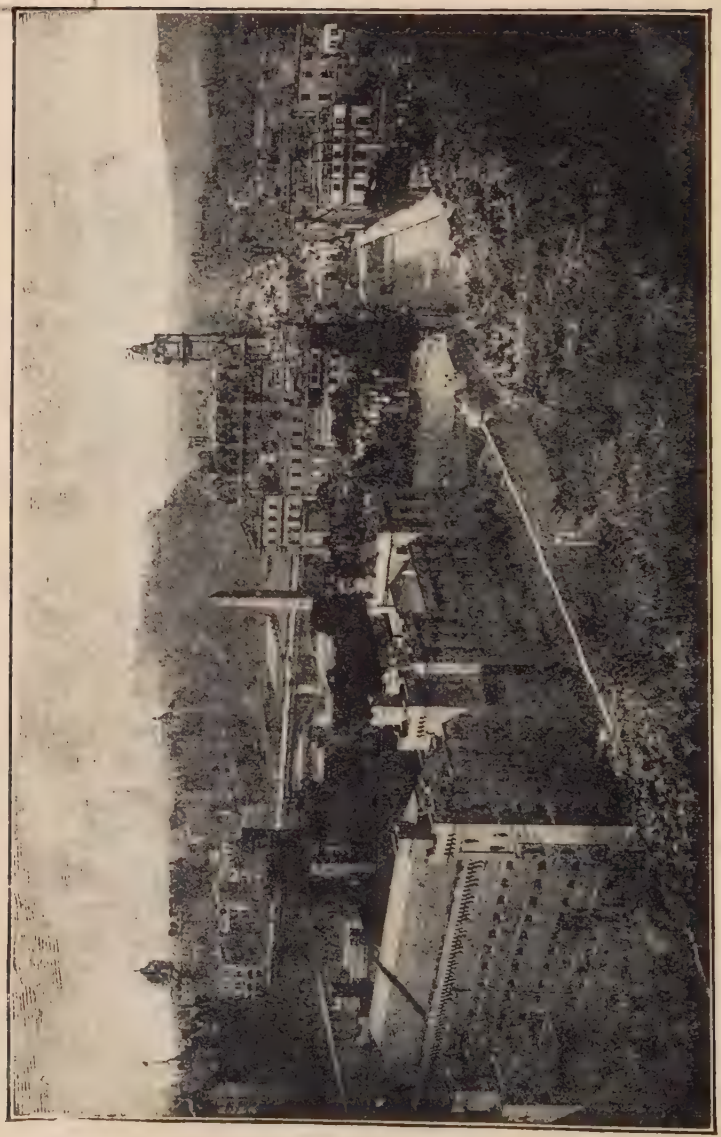

Fig. 80.—View of Edinburgh.

[G. W. Wilson & Co., Aberdeen.

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The portions of these rivers which lie within the Lowland are tidal, and the Central Lowland of Scotland is therefore not only fertile, but also very accessible to shipping. Large vessels go up the Clyde to Glasgow, and there is a canal for smaller vessels from Glasgow to the Forth. Measure the length of this canal. It enters the Forth at Grangemouth.

But the Central Lowland is not only an agricultural district; it also possesses coalfields. Therefore the Scottish mills and factories are mostly there.

You will remember that in the north of England much of the coal lies high in the shoulders of the Pennine Moorlands, so that many of the factories stand in bleak positions above the farming country. In Scotland, on the other hand, nearly all the coal is beneath the Central Lowland, not in the Highlands and the Southern Uplands. It has thus come about that the best agriculture and the chief factories are in the same part of Scotland, but in England they are in different parts.

The two great cities of Edinburgh and Glasgow have grown up side by side, only forty miles apart, in the centre of Scotland. Stirling and Perth are ancient towns, placed, as we have already seen, where the east coast road crosses the Forth and the Tay, just at the points where these rivers begin to widen into their estuaries or firths.

Dundee and Aberdeen, the third and fourth cities of Scotland, are ports supplying the needs of the fertile strip of low country which extends

FIG. 81.—THE CENTRAL LOWLANDS OF SCOTLAND.

from the Central Lowland along the east coast. Between Glasgow and Edinburgh, and also to the south-west of Glasgow, have sprung up many modern manufacturing towns. Of these Paisley and Coatbridge are the largest.

Glasgow is now twice as large as Edinburgh, even

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FIG. 82.—THE 'AQUITANIA," A STEAMER OF 50,000 TONS BUILDING ON THE CLYDE.

if you include the port of Leith with Edinburgh. Indeed, Glasgow is second only to London in point of size among all the cities of Britain. It contains a million people, or more than a fifth of the population of Scotland.

Glasgow is like Liverpool, Manchester, and Birmingham combined, for it is a port like Liverpool, it makes woven goods like Manchester, and it manufactures steel like Birmingham.

On the banks of the Clyde, below Glasgow, are very large shipbuilding yards. Ships used to be built of wood, but now they are made of steel. Therefore the best place for modern shipbuilding is an estuary which runs up into a coalfield where there is also iron-ore.

Edinburgh is the historic capital of Scotland. There sit the chief judges of the northern kingdom. Formerly the Scottish Parliament assembled and the Scottish King resided there.

Edinburgh is a very beautiful city, with an old castle standing on a rocky crag, like that of Stirling. Being on the eastern side of the island, it is not so wet a place as Glasgow, and having much smaller industries, it is less darkened with smoke.

Close by Edinburgh, on the north shore of the Firth of Forth, just west of the great Bridge, is Rosyth, one of the dockyards of the Navy. Rosyth stands opposite to the German dockyards on the other side of the North Sea.

Let us look at the railway map in some book of time-tables. There we shall see a close network of railways in the centre of Scotland. A number of lines extend also south-westward to the coalfield of Ayrshire, and others run along the fertile strip north-eastward to Aberdeen and Buchan. Elsewhere there are but few railways in Scotland, because the population in the higher parts is so sparse that many railways would not pay.

CHAPTER XXI. THE SCOTTISH COUNTIES

SCOTLAND is divided into thirty-three counties. If we compare Fig. 83 with Figs. 51 and 60, we may learn some interesting facts about these counties.

Let us start from the north. There we see the county of Orkney, containing two groups of islands, the Orkneys and the Shetlands. Next we come to the small county of Caithness, which is the low-lying end of one of the two great eastward promontories of Scotland. Although it is but a small county, it has a larger population than the broad county of Sutherland, which adjoins it. This is the natural consequence of its lower level, its softer climate, and its better soil.

The three large counties of Sutherland, Ross, and Inverness spread northward, westward, and southward, from the head of Moray Firth. Ross and Inverness extend even to the Hebrides. The three chief towns, Dornoch, Tain, and Inverness, stand on the east coast, upon the narrow plain of agricultural land. Elsewhere in these high, barren counties there is nothing larger than a village.

FIG. 83.—SCOTLAND, POLITICAL.

Then we come to a series of five counties ranged along the east coast, round the second of the eastward promontories of Scotland. Their county towns, Nairn, Elgin, Banff, Aberdeen, and Stonehaven, are placed, as we may learn from the maps, in the coastal lowland.

The counties of Forfar and Perth also have their county towns outside the mountains, although not upon the coast. The towns of Forfar and Perth stand in the fertile strip of Strathmore, through which the east coast road is carried round the heads of the Firths of Tay and Forth.

Thus we have no less than eleven Highland counties ranged along the east coast. In each case the county town is outside the mountains, and therefore easily accessible by road from Edinburgh.

Only two Highland counties remain, Argyll and Bute. The latter is made of the islands of Bute and Arran, and may be compared to the county of Orkney, for it is wholly insular.

Argyll, as we have seen, consists of a group of peninsulas and islands north and west of the Firth of Clyde. It was the home of the powerful Campbell clan, who were at enmity with the clans of the northern and eastern Highlands. The Duke of Argyll, whose castle is at Inveraray, the county town of Argyll, is the chief of the Campbells. Near the end of the peninsula of Kintyre you will find a place called Campbeltown.

Most of the counties of the south of Scotland

are smaller than those of the Highlands, but far more populous. On the east coast, the county of Fife occupies the peninsula between the Firths of Tay and Forth. On its border, towards Perthshire, are two curiously small counties, Kinross and Clackmannan.

West of Fifeshire, the two counties of Stirling

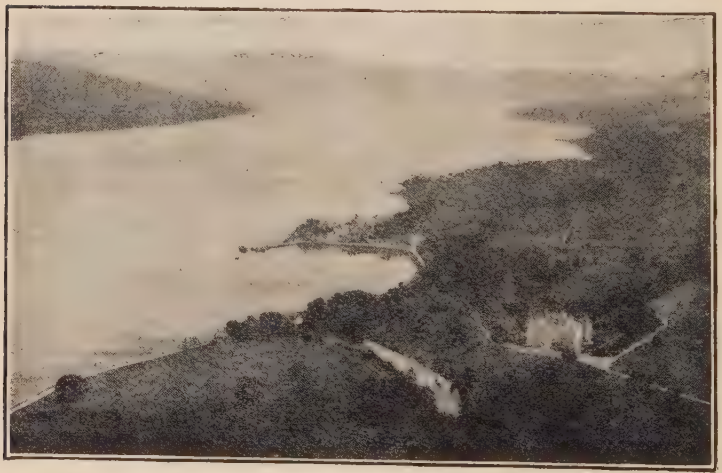

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FIG. 84.—LOCH FYNE, A SEA-LOCH, AND INVERARAY CASTLE.

and Dumbarton share the lowland between the Forth and the Clyde. Each of them sends a tongue up into the Highlands, the one to the east and the other to the west of Loch Lomond.

The remaining counties of Scotland are ranged along the chief valleys, or beside the coasts. There are four groups of them.

Along the southern shore of the Firth of Forth is the country of Lothian, divided into the three counties of Linlithgow, Edinburgh, and Haddington, which are also known as West Lothian, Mid Lothian, and East Lothian.

South of Lothian are the four counties of Peebles, Selkirk, Roxburgh, and Berwick, which together occupy the basin of the Tweed, just as the county of Yorkshire in England nearly agrees with the basin of the Ouse. You remember, of course, that the town of Berwick was long ago taken by England from the county of Berwick.

Then we have the two counties of Lanark and Renfrew, occupying very nearly the basin of the Clyde. They are densely peopled because of their coal.

Lastly, we have the promontory which runs out into Galloway in the south-western corner of Scotland. The west coast here belongs to Ayrshire, but the south coast, along the Irish Sea, is divided between three counties, Dumfries, Kirkcudbright, and Wigtown.

Now run over the counties of Scotland again, and note that nearly every county town is placed either on or near the coast, or else upon an important river. When the counties were formed men travelled about chiefly by water, and the most important towns were placed near the waterways. This is surely natural in a mountainous land where road making was very difficult.

We know that the counties were formed when the towns had already grown up, because most of them are named after their county towns, just as in the north of England. But the county town is not now always the largest place in the county. Glasgow, for example, has grown to be very much larger than Lanark, the county town of Lanarkshire, in which Glasgow is situated.

Now we will cross over to Ireland. We will ask for a book of time-tables, in order to find out a good train from Glasgow for Belfast, or from London for Dublin. Let us note on the map which of the sea-passages we take.

CHAPTER XXII. IRELAND AND SCOTLAND

Ireland and Scotland are in some ways very like, and in other ways very unlike. Let us examine them upon the maps, and see how they resemble one another and how they differ.

Ireland is a separate island, but Scotland is a peninsula attached to England by an isthmus. This difference between the two countries is important, because you can travel by railway from England to Scotland, whereas the sea must be crossed in going to Ireland. On the left-hand map, in Fig. 85, p. 150, you may see the points of Great Britain which approach nearest to Ireland. Measure the distances across.

Let us next compare the two countries in respect of size. Examine the scales of the two maps carefully by measuring them with a piece of paper. If you find that a hundred miles of country is shown by the same length of paper on both maps, then you may measure the length of Scotland against the length of Ireland. But if the scales are not alike, then you must measure out each country according to the scale of its own map. We learned how to do this in the early chapters of this book.

FIG. 85.—IRELAND AND SCOTLAND.

You will find that Scotland is longer than Ireland, but you must bear in mind that Ireland is more rounded and compact in outline, for the sea sends firths and lochs far into Scotland. Although it is the longer, Scotland contains a little less land than Ireland. For practical purposes, however, we may think of them as alike in size.

Now let us compare them in respect of height. First we notice the numbers on the two maps which give the heights in feet of the highest mountains. In Scotland the highest points are a little more than 4,000 feet, whereas in Ireland they are a little less than 4,000 feet. Although the highest points of Scotland are thus a little higher than those of Ireland, yet the difference is not very great, and we may speak of both countries as mountainous.

But it is not enough merely to consider the highest points. A country may be generally low, and yet may contain a few very high mountains. Look at Scotland in Figs. 52 and 59. About half of it is tinted. You learn by looking at the index in the corner of the maps, that the part of the land which is tinted is more than 600 feet above the sea level. Thus Scotland is generally a high country, with lowlands only in the centre and along some parts of the coast.

The map of Ireland, on the other hand, which you find in Fig. 86, shows that most of that country is lower than 600 feet. Only here and there do we see patches of higher ground.

FIG. 86.—IRELAND. RAILWAYS.

FIG. 87.—IRELAND, PHYSICAL.

If the sea were to rise 600 feet above its present level, it would everywhere flood the lowlands, and only the higher grounds would rise out of it as islands. The Northern Highlands and the Grampian Highlands of Scotland would each be a fairly large island. Between them there would flow a long narrow strait, where is now Glenmore. South of the Grampian Island would be a broad channel, with some small hilly islands, where is now the populous Central Lowland of Scotland.

South of this again would be a chain of three large islands. The first would consist of the Southern Scottish Uplands and the Cheviots. The second would consist of the North Pennine Moors and the Lake Mountains. The third would be the South Pennine Moorland ending in the Peak of Derbyshire. These three islands would be divided by narrow straits, where are the Tyne Gap and the Aire Gap.

Now consider Ireland. If that country were flooded to a depth of 600 feet, it would not be reduced to a few large islands, but would become a scattered group of small islands. In other words, it is in the main a low-lying country, but it is studded with mountains, which rise steeply into peaks, and these peaks are nearly as high as the broad rolling moors of Scotland.

Let us next consider how the population is settled in the two lands. We saw that in Scotland nine-tenths of the people are gathered into the small Central Lowland. Neither the Southern

Uplands nor the Highlands are well fitted for agriculture, for they are bleak and sterile. Nor do they contain coalfields, so that they lack industries.

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FIG. 88.—MOUNTAINS RISING ABRUPTLY FROM AN IRISH PLAIN.

Compare with Fig. 40, p. 64. Note the peat-bog in the foreground, with the stumps of ancient trees.

In Ireland, on the other hand, the broad lowlands admit of farming in most parts, so that the population is scattered evenly over the whole country. The map shows that there are only a few small coalfields, and these do not produce the best coal. Therefore coal is imported by ship from Great Britain, and the Irish manufacture little, except round the sea-ports.

There are rather fewer people in Ireland than in Scotland, but the difference is not great, and you may think of each country as having between four and five million people. But Glasgow, the largest town in Scotland, is two or three times as large as Belfast, the largest town in Ireland. Most of the Irish are farmers and labourers in the country.

We may add one other likeness between Ireland and Scotland. In both countries two languages are spoken. In all the east of Ireland, and in all the south and east of Scotland, the mother tongue of the people is English, but in the north-west of Scotland and in the west of Ireland it is Celtic.

The Celtic language spoken in Scotland is nearly, but not quite, the same as that spoken in Ireland. For instance, the word for lake is "loch" in Scotland and "lough" in Ireland. You write Loch Lomond, but Lough Neagh. Most of the people, however, in both countries speak English. Even those whose mother tongue is Celtic can mostly speak English as a second language.

Let us sum up the points in which Ireland and Scotland are alike, and those in which they differ.

1. The two countries are of nearly the same size, but one is an island of rounded outline, and the other a peninsula of jagged outline. Scotland is therefore much better fitted for commerce, because ships can go far inland, and railway trains

can enter from England. On the other hand, it has been very costly to make railways in the Highlands.

2. Scotland is a high country with only small lowlands, but these lowlands are good for agriculture, and also contain coal. Ireland, on the other hand, is a low country in general, although it has high mountains in parts. As a whole it is better fitted for agriculture than is Scotland, but it lacks coal. Therefore, although the populations of the two countries are nearly equal, the Scottish population is chiefly gathered into a small part of Scotland, while the Irish people are scattered nearly equally over all Ireland.

3. Although Ireland and Scotland each have Celtic-speaking people along the Atlantic coast, yet in both lands those parts which are nearest to England contain an English-speaking population.

CHAPTER XXIII. THE LONGEST OF BRITISH RIVERS

On the map of Ireland in Fig. 86 find the position of Dublin. For about fifty miles northward of Dublin, the land is left white, for this part of the coast is low. Note that the white extends unbrokenly westward, very nearly to the Atlantic. Along the western shore, however, some tinted strips indicate a rocky barrier. High mountains there separate the lowland from the ocean.

It would be well to measure upon the map the length and breadth of the central plain of Ireland. Eastward, as we have just seen, it ends on the coast, but northward, westward, and southward it ends at the foot of mountains. Among the northern and southern mountains are many smaller strips of plain.

The Shannon, the longest river in the British Islands, flows from north to south completely across the central plain. It rises in the northern mountains, but enters the sea through an opening in the southern mountains. At this opening, at Castle Connell, the mountains rise to right and left of the river, and there is a rocky impediment

in its bed, over which the water bounds in a cas-

FIG. 89.—THE BASIN OF THE SHANNON.

Note to what extent the West of Ireland would be drowned if the sea were to rise 600 feet.

cade, known as the Leap of Doonas. The Falls of the Shannon are not high, but they are impressive,

because of the great volume of water which comes over them.

The river is very different above and below the falls. Above the falls, it glides slowly through the plain, and spreads out into large lakes, in which are beautifully wooded islands. Below the falls,

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FIG. 90.—THE FALLS OF THE SHANNON AT CASTLE CONNELL.

it forms a magnificent estuary more than sixty miles long, at the head of which is the seaport of Limerick.

As the map shows, most of the Upper Shannon is a chain of lakes, and it is not easy to find a place for a bridge. The chief bridge is at Athlone,

almost exactly in the centre of Ireland. Here there is a great cattle market. The cattle are shipped down the Shannon to Limerick in steamers, which pass the falls by means of a canal.

The lakes through which the Shannon flows are not like the lakes of Scotland and the north of England. They have low banks, and are merely flooded portions of the plain, whereas the lakes of Scotland and the north of England lie in valley bottoms between high mountains.

Most of the trade of Ireland is done with Great Britain. It is therefore unfortunate that the mouth of the Shannon turns westward and not eastward. Ships from Limerick must go round the south of Ireland on their way to England.

Ireland is divided not only into counties, like England and Scotland, but also into four provinces, which were once independent kingdoms.

Two of these provinces, Leinster and Connaught, are separated by the Shannon, where it flows southward through the central plain. The chain of lakes must once have been a very useful boundary between the two kingdoms.

Connaught contains the part of the Irish plain which lies west of the Shannon, and also the rim of mountains along the Atlantic coast. Leinster contains the part of the plain which lies east of the Shannon, and also the group of the Wicklow Mountains on the east coast immediately south of Dublin. To the north of Leinster and Connaught, filling the rounded projection towards

Scotland, is the province of Ulster. The province of Munster occupies the south of Ireland. County Clare, which is the point of land north of the Shannon estuary, belongs to Munster and not to Connaught.

Lately Ireland has been divided into two countries, Northern Ireland, whose capital is Belfast, and the Irish Free State, whose capital is Dublin. Six of the counties of Ulster constitute Northern Ireland. These six counties will be found enclosed in a heavy black line on the map (Fig. 98) on p. 178. On p. 170 we said that Belfast is in many ways more Scotch than Irish; that is the reason why the six counties round Belfast have separated from the rest of Ireland.

By great engineering works advantage has been taken of the Falls of the Shannon above Limerick to generate electricity, which is carried by cables right across Ireland to supply light and power to Dublin. These works are to be completed in 1930.

CHAPTER XXIV. THE EMERALD ISLE

Ireland is often described as the Emerald Isle. The emerald is a very beautiful precious stone which is green, and Ireland is compared to the emerald because green is its general colour.

In Scotland and the north of England, as we have seen, there are great moors of purple heather. In other parts of England the ploughed fields are at one season dark and naked, and at another golden with the harvest. But Ireland is a land of green grass and moss, almost from end to end, and at all seasons. This is caused by its moist climate, for the broad waters of the Atlantic Ocean spread around it, far to the north, west, and south.

If the wind in this part of the world blew mostly from the east, then the oceanic position of Ireland would not much matter. The east wind would bring dry air off the great continent, and there would not be very much rain.

But on most days of the year the wind in our country blows from the north-west, the west, or the south-west. Therefore it brings to Ireland moist air from the ocean. As this air drives against the high Irish mountains it forms clouds,

and the clouds throw down much rain, and the green grass grows.

There is another way also in which the neighbourhood of the Atlantic Ocean influences the climate of Ireland. To understand how this happens you should make an experiment.

Take a piece of stone and tie it to the end of a string, and then hold it by the string for some time in a cup of hot water, until the stone and the water are at the same heat. Lift the stone out, and let it stand beside the cup of hot water on a table. The stone will grow cold much more quickly than the water.

Now put the water and the stone side by side for a few minutes in the oven or on the hob, and then replace them on the table. The stone will have become much hotter than the water.

The lesson you learn from this experiment is that the land, which is made of stone and earth, grows cold and gets hot more quickly than the sea. Therefore if the wind came most often from the east, it would be a hot wind in the summer, and a cold wind in the winter, because it would blow off the land.

In Ireland, however, the wind comes chiefly from the west, from the ocean, and brings on to the land the temperature of the water. Therefore in the Irish summer, although the air is warm, it is not very warm, because the sea does not then become so hot as the land. Likewise in the winter, although the wind is cool, yet it is not

very cool, because the water from which it blows cools only slowly, and therefore in the winter-time it still keeps much of the heat of the previous summer.

For these reasons we say that Ireland has an oceanic climate. At all times of the year it is moist, and the heat of the summer and the cold of the winter are not excessive. In Ireland there is not nearly as much snow as in England, and the grass remains green and good for the food of cattle through most of the winter, especially in the west of Ireland. But, on the other hand, Ireland does not grow much wheat, partly because there is too much rain in the summer, and partly because the summer is not hot enough to ripen the wheat.

The wealth of Ireland consists chiefly of horses and cattle and pigs. The crops are mostly hay and potatoes and oats. There are nearly as many cattle in Ireland as there are in all Great Britain, although Great Britain is nearly three times as large as Ireland. But the sheep of Great Britain are much more numerous than those of Ireland, for they live on the short mountain grass of the broad uplands, whereas the rich lowland meadows of Ireland are better fitted for cattle.

One result of the agricultural character of Ireland is that it trades chiefly with Great Britain, and not with foreign lands across the ocean. Close at hand there is a good market for Irish produce. The great manufacturing towns of

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FIG. 91.—O'CONNELL STREET, DUBLIN.

England and Scotland require large supplies of food. Now food is just what Ireland produces most. It sends to the sister island butter and bacon and cattle. It also sends hay to be eaten by the horses in England.

If you think all this over, it will not surprise you to find that the largest places in Ireland are not in the interior, but are seaports. There are only six of them which are larger than little market towns. Arranged in order of size these are Belfast, Dublin, Cork, Londonderry, Limerick, and Waterford.

You will notice at once that five out of these six are on the coast opposite to England and Scotland. Only one is on the west coast, and it would not be there, but that the great river Shannon flows to the west. Yet all the way along the west coast of Ireland there is abundance of harbours. Indeed, many of the finest harbours in the British Isles are placed side by side between the rocky headlands along this coast.

One group of these harbours and the promontories between them appear on the map as a remarkable fringe, like the fringe of a shawl, at the south-west corner of Ireland. The steamers from America pass daily within sight of Cape Clear, the southern point of Ireland, and yet these harbours are not used for commerce, because around them there are no coalfields and factories, as there are round the Clyde in Scotland and the Mersey in England. There are not even fertile

meadows, as there are in the central plain near Dublin, for these splendid harbours, whose length you might measure, are surrounded by the highest

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FIG. 92.—THE BOG OF ALLEN.
The peat is being cut for fuel.

mountains in Ireland. The mountains are very beautiful, but they produce little food, and support only a small population.

The western mountains of Ireland are clothed with bog-moss, and only in steep places does the naked rock show through. This is due to the constant moisture of the air.

Moss is abundant also in the central plain, where it grows along the borders of the lakes, and indeed has often filled them with peat, which is merely dead moss heaped layer upon layer and turned brown.

The surface of the great peat-bogs is green in the springtime, with young moss on the top, but it is very treacherous, and liable to engulf men or animals which venture upon it. In the autumn the peat turns brown. It is cut and dried for fuel. In most Irish houses there are peat fires, not coal fires.

CHAPTER XXV. A JOURNEY THROUGH IRELAND

Now that we have learned about Ireland, let us bring our foreign friend from Scotland and show him the country. I think we last saw him at Stirling. Let us follow carefully upon the map his journey through Ireland. Naturally he will cross by steamer to that corner of the country which is nearest to Scotland.

Belfast will be the first large place to which he will come. It lies at the head of Belfast Lough, an estuary of the sea. The Irish, like the Scotch, apply the word "lough" to arms of the sea, as well as to fresh water lakes.

Belfast is one of the busiest cities in the whole British Isles, and is larger even than Dublin. In many ways it is more Scotch than Irish, for many Scotch people have settled in this corner of Ulster.

Belfast first grew rich by the manufacture of linen. The flax plant, from the fibre of which linen is made, is grown in this part of Ireland, and nowhere else in the British Isles. But the Irish factories require much more flax than is raised in Ireland, and raw flax is therefore imported to Belfast in large quantity.

In recent times shipbuilding has become as important at Belfast as the manufacture of linen. This is curious, because all the steel and coal have

FIG. 93.—FLAX RIPPLING IN ULSTER.

The word to "ripple" here means to "strip."

to be brought across the water from Scotland and England. In part it is due to the skill and enterprise of a few men, but in part to the fact that women and girls are chiefly employed in making linen, and that the men of their families are free for other work.

From Belfast we can go to Londonderry either by rail or by steamer. If we go by rail we pass Lough Neagh, the largest lake in the British Isles.

Copyright.] [*W. Lawrence.*

FIG. 94.—GLENGESH IN DONEGAL.

[Copyright]

FIG. 95.—GLEN HEAD IN DONEGAL.

It is only a little smaller than the English county of Rutland, and it is larger than the county of London. This you can see for yourself by drawing, on the same sheet of paper, the outline of Lough Neagh, and the outlines of the counties of Rutland and London. Of course you must take care that you draw them all on the same scale. There are storms which are dangerous for boats on the broad waters of Lough Neagh.

If we go from Belfast to Londonderry by sea, we pass round a coast with splendid cliffs. As we turn Fair Head we see the columnar basaltic rocks of the Giants' Causeway, which we have already described.

Londonderry is a smaller town than Belfast, but is inhabited by the same Scotch-Irish people, and is engaged in the same linen manufactures. Its old name was Derry simply. It took the name of Londonderry because the citizens of London were at one time granted much land in the district around.

Beyond Londonderry is County Donegal. Here we leave the rich manufacturing portion of Ulster, and enter one of the wildest parts of Ireland. Donegal is filled with mountain ridges, which are bare of trees, and often clothed with bog. Southwestward the mountains of Donegal end in some of the most magnificent cliffs in the world. They tower two thousand feet above the ocean below them.

Returning now to Belfast, we start southward

along the east coast. We pass the Mourne Mountains, a group in the south of County Down, visible from the Isle of Man. Then we come to the central plain of Ireland. Near Drogheda we cross the river Boyne.

So we reach Dublin, which stands at the mouth of the river Liffey, just where the mountains of Wicklow sink into the central plain (Figs. 86 and 87). The roads, canals, and railways radiate from Dublin northward, westward, and southward over the whole of Ireland. Most of the manufactured articles required by the Irish population are imported from England through Dublin.

The portion of Ireland which lies south of a line drawn westward from Dublin through Athlone to Galway contains a great deal of beautiful country. Immediately south of Dublin are the mountains of Wicklow, whose scenery is very like that of Wales on the opposite side of St. George's Channel.

In the midst of Wicklow is the lovely valley of Glendalough, with a curious and very ancient round tower (*see* Fig. 96). There are two little lakes also at Glendalough, into which St. Patrick is said to have driven all the snakes of Ireland, so that they were drowned. This took place a long time ago, and you need not believe it unless you like. But it is a fact that there are now no snakes in Ireland, although there are poisonous adders in many parts of Great Britain.

Copyright.] [W. Lawrence.

FIG. 96.—GLENDALOUGH.

At the south-eastern corner of Ireland we come to Waterford, placed where three rivers—the Barrow, the Nore, and the Suir—gather to a single estuary. Waterford is a considerable port.

The rest of the south of Ireland is like a piece of ploughed field on a great scale. The ridges and furrows are mountain ranges and valleys

Fig. 97.—The Rivers of the South of Ireland.

lying side by side. The rivers Blackwater, Lee, and Bandon flow eastward, their valleys being straight like the ploughed furrows. Then each in turn makes a sudden bend southward, and passes through a gap in the neighbouring mountain ridge. There are very beautiful woods in these valley bottoms.

The estuaries of the Blackwater, Lee, and

Libraries.

FIG. 98.—IRELAND, POLITICAL.

Northern Ireland is enclosed within the heavy black line.

Bandon are useful harbours. The most important of them is that of the Lee, which forms Cork Harbour. Cork is the chief town of the south of Ireland, but very much smaller than Belfast in

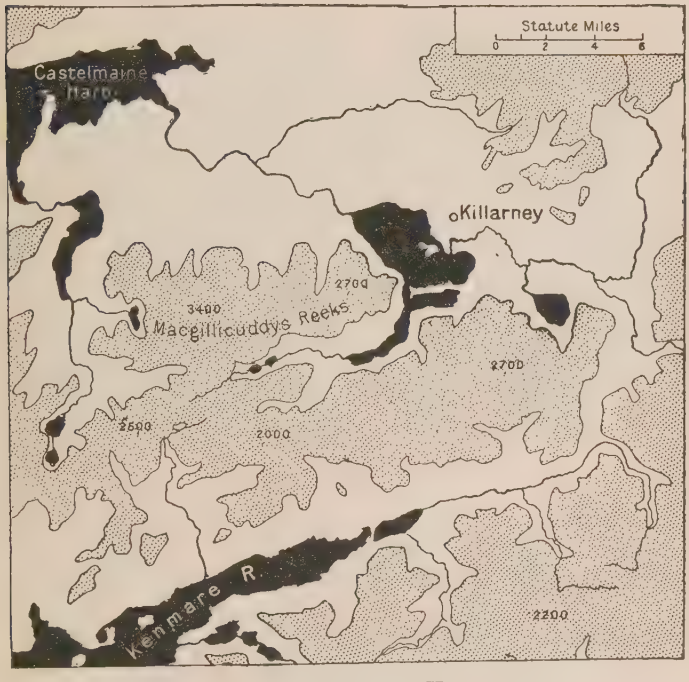

FIG. 99.—THE LAKES OF KILLARNEY.

Dotted portion more than 600 feet.

the north. It is a seaport, exporting the produce of the surrounding country, and has few manufactures.

In Cork Harbour is an island on which stands Queenstown. Here some of the Atlantic steamers

make a short call on the voyage between Liverpool and New York.

Finally, west of Cork is the most beautiful district in Ireland. At the foot of the highest peaks

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FIG. 100.—KILLARNEY.

in the island, known by the extraordinary name of Macgillycuddy's Reeks, are the lakes of Killarney, with wooded banks and islands. The Atlantic mists hang round the heights with ever-changing effects of sunshine and cloud.

CHAPTER XXVI. THE WELSH MOUNTAINS

WALES is a smaller country than Scotland or Ireland. It is only half as large as either of them. When we look at the map of the British Isles, we ask why Wales ever came to be a separate country from England.

It is true, of course, that there is sea to north, west, and south of Wales, and that Wales is therefore a peninsula. But it is a very different kind of peninsula from Scotland, for no narrow isthmus joins it to England. The connection is so broad that Wales is attached to England by nearly the whole length of one of its sides. If a peninsula of this kind were necessarily a separate country, then the counties of Norfolk and Kent in the east of England would also be separate.

What then is it which has caused Wales to be a land apart ? Let us inquire into its height, and see if the cause lies there. We will be a little more precise than we were in dealing with Scotland and Ireland. To study the height of Wales we will use what are called contour-lines.

Now what is a contour-line ? The word "contour" means "shape." Therefore a contour-line

must mean a shape-line. If a man goes to a tailor to order a suit of clothes, the tailor begins by measuring him. Let us say that he is a tall, very stout man, and that he measures 45 inches round the waist. The tailor might put this down on a sheet of paper in the way in which we have put it down in the left-hand drawing of Fig. 101. Our drawing is to a scale of one-twentieth. One inch on the paper is therefore the same as twenty inches on the man's waist. If with a bit of thread you carefully measure round the line shown,

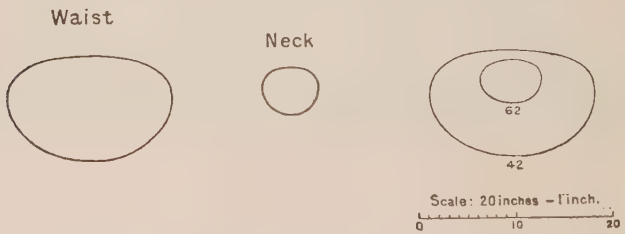

FIG. 101.—CONTOUR LINES OF A MAN.

and then multiply by 20, your result should be 45 inches.

Notice that the line is not quite circular; the loop is flattened on one side to represent the man's back. Thus the line that we have drawn shows the *shape* of the man's waist, as well as the distance round it according to the scale. If the man's waist be 42 inches above the soles of his boots, then we have here his contour-line at a height of 42 inches.

Suppose that the tailor's next measurement

were round the man's neck. We can find from the loop shown in the middle drawing of Fig. 101 how many inches he is round the neck, because this loop is also drawn on the scale of one-twentieth. If his neck be 62 inches above the soles of his boots, then this is the man's contour-line at a height of 62 inches.

Now look at the right hand drawing in Fig. 101. Both the loops are here shown in one drawing. Against the larger of them is written 42 inches, and against the smaller 62 inches. The scale below tells you that the drawing is one-twentieth of the natural size. From this one drawing we can tell the exact shape and size of the man at a height of 42 inches and again at 62 inches. In other words, we have his contours at those heights.

Let us think of the matter in another way. Suppose our friend were to leave the tailor's shop and were to go for a bathe in the sea. If the sea were very calm indeed, and there were no waves on it, the water would rise steadily as he waded out on the sloping shore. At a height of 42 inches he would make a hole in the surface of the sea, whose shape and size would be like that of the outer contour-line in Fig. 101. When at last he was neck deep, the hole in the surface would be that shown by the inner contour-line.

Now let us look at the picture and the three little maps in Fig. 102. They show us in four different ways the mountain of Holyhead. This mountain is 720 feet high, and is seen far out at sea when

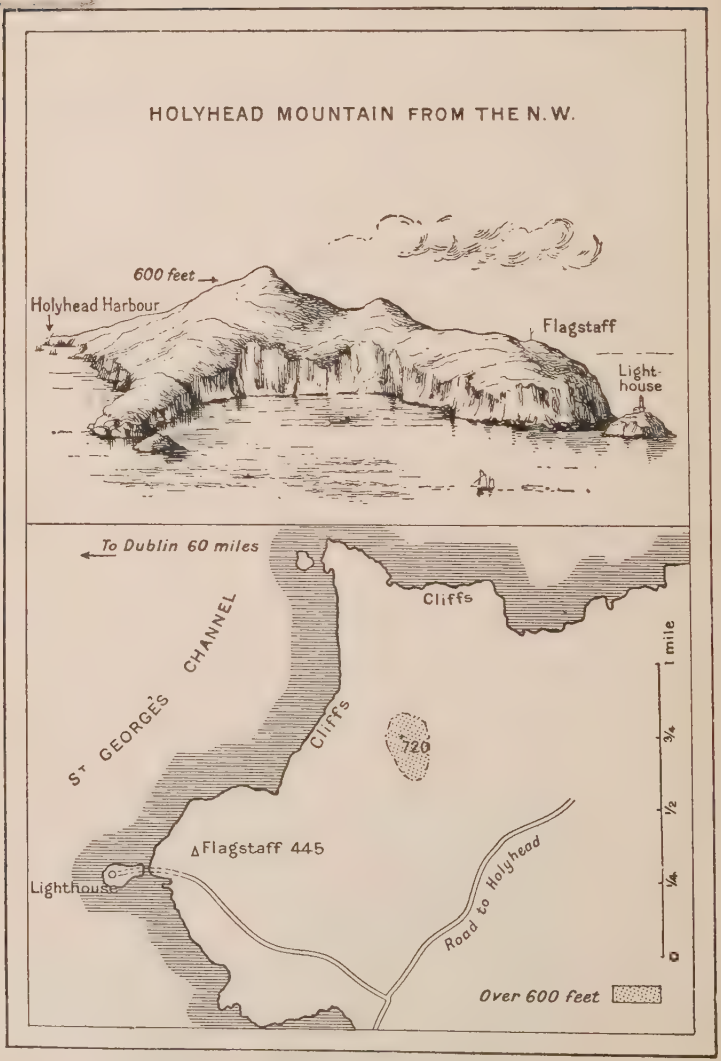

FIG. 102A, 102B. —HOLYHEAD MOUNTAIN.

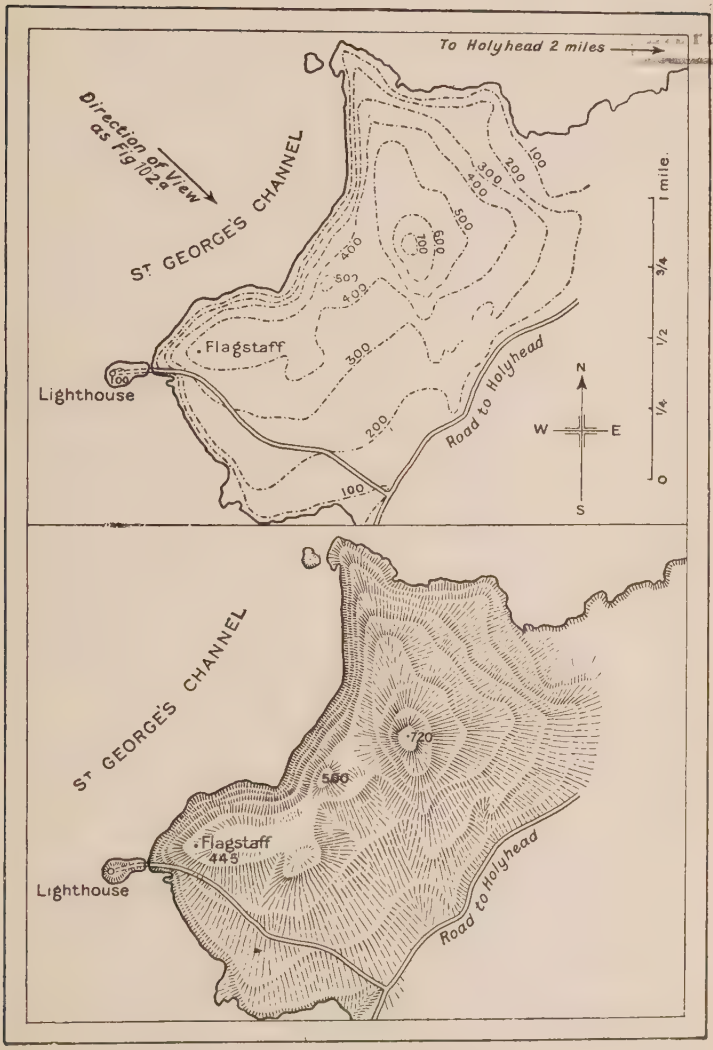

FIG. 102c, 102d.—HOLYHEAD MOUNTAIN.

you are coming to Wales from Ireland. The harbour of Holyhead is at its foot, and there the steamers land their passengers from Dublin.

Fig. 103A, 103B, 103C, 103D.—The Welsh Mountains.

Fig. 102B has been drawn in the same way as many of the other maps in this book. Let us suppose that the sea rises 600 feet up the sides

of the mountain, as we saw it rise just now up to the neck of the man. The dotted part of the map shows how much of the mountain would remain above the water, and the line round this dotted space is the 600-foot contour-line. It shows the shape of Holyhead mountain at a height of 600 feet above the sea. In Fig. 102A we have marked the height of 600 feet by an arrow.

But Fig. 102C teaches much more of the shape of the mountain than Fig. 102B, for there is a contour line every hundred feet from the seashore to the top. The contour lines are put one within the other, just like the neck-line and the waist-line of the man in the right-hand drawing of Fig. 101. We can show in this way any number of contour-lines on a mountain, for it grows steadily smaller to the top, whereas a man is widest about half-way up.

Make a dot with your pencil at some point where you would like to stand on the mountain and enjoy the view. You can count the contour-lines up from the sea, and so learn how high you have climbed. This you can do on Fig. 102C, but on Fig. 102B you can only find out whether you are above or below 600 feet.

In Fig. 102D we have yet another way of showing our mountain. This is known as hill-shading. The strokes of the shading are drawn down the slopes, not round them like the contour lines. They show you the way the water runs off the sides of the mountain when it rains. Each

little black stroke is a furrow made in the steep slope by the rain-water coursing downward.

Next we will consider the four little maps in

FIG. 104.—THE WELSH MOUNTAINS, COMBINED CONTOURS.

Fig. 103. If the sea were to rise 500 feet round Wales, it would flow in over the low ground, and only that land would be dry which is above 500 feet, as shown in Fig. 103A. If the sea rose further

to 1,000 feet, the land above the water would be as shown in Fig. 103B. If the sea rose still further to a level of 2,000 feet above its present surface,

FIG. 105.—THE WELSH RIVERS.

only those small parts shown in black in Fig. 103C would stand above the now broad waters. And lastly, when the sea rose to 3,000 feet a few summits in the north of the country would be all

that remained above the ocean. One of these summits, Snowdon, would be a short hilly island, about 600 feet high, for the height of Snowdon above the present sea level is about 3,600 feet. It is the highest mountain in Wales.

All four of these contour lines are shown together in Fig. 104. We see there the contours of Wales at 500 feet, 1,000 feet, 2,000 feet, and 3,000 feet above the sea. If you make a tracing of Fig. 104, and then shade with pencil the parts *below* 500 feet, you will see clearly the deep valleys running up into the high ground. In Fig. 105 are the rivers which fit into these valleys.

Let us turn to Figs. 86 and 106. The parts of the land which are tinted are more than 600 feet high, and those which are left white are less than 600 feet high. Therefore, where the tinted and white spaces join is the 600-foot contour line.

With the help of a local map it would be interesting to find the direction and distance from us of the highest mountain or hill in our part of the country. Let us also find its height above our schoolroom.

This is a very difficult chapter, and you will probably have to read it again and again in order to understand it; but it is worth the trouble, because if you understand this chapter you will find every chapter in this book, and in the other books which come after it, easier to understand and more interesting.

CHAPTER XXVII. THE PRINCIPALITY

Now let us come back to our question, and let us ask again how little Wales came to be a separate country from England.

The first thing that strikes us is that most of Wales lies more than 500 feet above the sea, and that a large part is more than 1,000 feet. On the other hand, only a few small districts rise to 2,000 feet, and only a few summits to 3,000 feet. Most of Wales is a rugged tableland.

You can easily measure on Fig. 106 the length and the breadth of the Welsh Upland, and you may find how many times it is longer and broader than it is high. It is in bas-relief like the Pennine Range, and like the King's head on a penny.

Therefore we must think of Wales as like the broad hilly districts of Scotland and the North of England. It is very different from the lowland of Ireland with its small groups of high mountains.

Let us recall for a moment the Scottish Highlanders. Two hundred years ago the Highlands of Scotland were inhabited by warlike clans, who at times came down the glens to rob the peaceful farmers of the Lowlands.

Fig. 106.—Wales, Railways.

FIG. 107.—WALES, PHYSICAL.

So was it also with Wales. There, too, the inhabitants were Celts who lived amid the mountains, and robbed the peaceful English farmers of the fertile lowlands of Herefordshire and Shropshire. Fig. 160 shows that all the centre, east, and south of England is a low-lying plain, and that Wales is a kind of fortress rising high above England along the Welsh Border.

Long ago the English came across the North Sea to conquer our island. At that time the Welsh were settled in the plain, but the English fought with them, and after killing many drove the rest into the mountains of Wales. There the Welsh continued to live, because the country was easy to defend. It is easy, is it not, to stop a person trying to come upstairs? And you get out of breath, do you not, when you climb a hill?

Now we have the answer to our question. Wales is an upland, where live the Welsh people. England is a lowland, where live the English people. The only considerable low-lying districts of Wales are the island of Anglesea and the peninsulas of Carnarvon and Pembroke. These districts are on the side of Wales away from England.

The language spoken by the Welsh is different from that spoken by the Celtic Irish and Scotch, but is so like the language of the Celtic people who live in the French peninsula of Brittany, that the Welsh and the Bretons can understand

one another, although they cannot understand the Scotch and the Irish.

The greater part of the Welsh people, like the greater part of the Scotch people, are gathered into one small district. This district is in the south, in the county of Glamorgan, where there is a rich coalfield. The coal of South Wales is of peculiar value, partly because it is the best coal in the world for use on board ship, and partly

FIG. 108.—THE COALFIELD OF SOUTH WALES.

because it lies not very far from the shore, and is therefore easily carried to the docks. South Wales sends coal to all parts of the world, chiefly through the ports of Cardiff, Barry, and Newport.

On the map you will see that Newport stands in the county of Monmouth. This is an English county, but it is inhabited largely by Welsh people and once was a part of Wales. Farther to the west, but still in the neighbourhood of the

coal, is Swansea, another great seaport. Here iron and copper ore, brought from foreign countries over the sea, are smelted with Welsh coal.

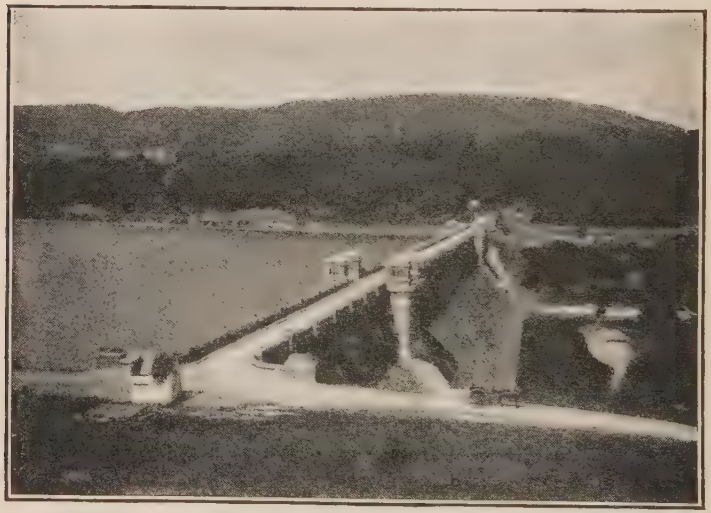

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FIG. 109.—THE DAM OF MASONRY BUILT ACROSS THE VALLEY TO MAKE LAKE VYRNWY, A RESERVOIR SUPPLYING LIVERPOOL.

In the remainder of Wales there is only a small population, for there is no fertile and cultivated lowland to be compared in size with that of Central Scotland. There are many cattle in the peninsulas of Pembroke and Carnarvon, and in the island of Anglesea. But the high ground of Wales is fit for the pasture only of sheep.

In the last few years even these barren uplands have become valuable, because they receive much rain from the westerly winds. Let us look at the

map. The Dee, the Severn, the Wye, and the Usk, which are the four chief rivers of Wales, all rise in heights near the west coast. They flow

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FIG. 110.—CARNARVON CASTLE.

through deepening valleys, like the Pennine dales, eastward into England. Emerging from these valleys, they wind through the English plain, and bending gradually round to north and to south, flow into the Irish Sea and the Bristol Channel.

At a great cost strong dams have been built across some of these Welsh valleys, so that the upper reaches of the streams have been converted into reservoirs. These reservoirs are so large that they are really artificial lakes. The

water is carried down into England by great pipes known as aqueducts, like the aqueduct from Thirlmere to Manchester. You will remember that we measured the length of the Manchester aqueduct when we were reading Chapter XII of this book. Liverpool and Birmingham are supplied with water from the reservoirs in the Welsh mountains.

Wales has no capital. The map tells us the reason why. There are only six easy roads in Wales. Four of them run from England up the four great river valleys; the other two follow the north and south coasts. Therefore the chief Welsh roads do not gather to any great centre, as the roads of Ireland gather from north, west, and south to Dublin.

In the time before railways it was easier for the people of North Wales to go to England by the valleys or the coast, than it was for them to cross all the length of the bleak hills in order to visit South Wales.

The principal railways follow the north and south coasts. They carry the passengers and letters for Ireland. The railway along the south coast leads to Milford Haven, a magnificent harbour used by the British Fleet, and to Fishguard, the packet station for Ireland. But the largest towns of Ireland are in the north and not in the south, and therefore the railway along the north coast of Wales is the more important of the two. The high road and the railway cross the narrow Menai

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FIG. 111.—MENAI STRAIT.

Strait into Anglesea by two celebrated bridges; the road goes over a suspension bridge, but the railway goes through a tubular bridge. Both road and railway end at the harbour of Holyhead, which stands opposite to Dublin, and to the centre of Ireland.

The Menai Strait is perhaps the most interesting part of Wales. Its shores are fertile, well wooded, and well farmed. A little inland is the beautiful mountain range of Snowdon.

This range served in the old days to defend the Menai district from English attack. When all the rest of the country had been conquered, the native Prince of Wales still held out behind the barrier of Snowdon. At last the English overcame his resistance, and they built three great castles to secure their rule, at Conway, Carnarvon, and Beaumaris. But as a record of the brave defence, and to honour his new subjects, the King of England called his eldest son the Prince of Wales. Therefore we often speak of Wales as the Principality.

CHAPTER XXVIII. THE SEVERN AND THE WEST OF ENGLAND

As we look along the west side of England on the map, we see four great features, and these features

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FIG. 112.—TRESCO GARDENS IN THE SCILLY ISLES.

lie in two pairs. First we have the square Irish Sea, and the broad, blunt peninsula of Wales. Then the whole character of the map changes, for we find the long narrow Bristol Channel running far up into the land, and the long narrow peninsula of the West of England standing far out into the sea.

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FIG. 113.—FLOWERS READY FOR PACKING, IN THE SCILLY ISLES.

A steamer can steam inland until it reaches the great port of Bristol, and a railway train can run through the counties of Somerset, Devon, and Cornwall, as far as Penzance and St. Ives, where the land ends. Ships bringing food from other

countries go up the channel to Bristol, in order that the food may be warehoused in the midst of a large population. But fishermen, whose work is on the sea, have their homes at places like St. Ives and Penzance, so that they may get quickly to their fishing grounds.

The first land sighted by a ship from the south when making for Bristol is the small group of islands called the Scilly Isles. The climate of the Scilly Isles is even milder than that of Ireland. This is due to their oceanic position. So mild are the winters and springs that the people of the Scilly Isles make much money by supplying early flowers to the London market.

There are twin capes at the end of Cornwall, the Land's End, which is the most western point of England, and the Lizard, which is the most southern point. Between these rocky headlands is Mount's Bay. Within this bay is St. Michael's Mount, crowned by a picturesque building, once an abbey, but now a private house.

North of the Lizard are the famous tin mines of Cornwall, worked by the ancients, but lately abandoned, with a few exceptions, because tin is now got more cheaply from the East. Many Cornish miners have gone to work for gold in South Africa. But tin is dear just now, and some of the mines have been re-opened.

The peninsula broadens, as we travel north-eastward, into the large county of Devon. The hills also become higher, and are separated into

three masses, known as Exmoor in the north, and Dartmoor and Bodmin Moor in the south.

The two latter are divided from one another by the deep valley of the Tamar, which rises close to the north coast, and flows southward between the counties of Cornwall and Devon.

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FIG. 114.—PLYMOUTH PIER, THE BREAKWATER IN THE DISTANCE

At its mouth, the Tamar spreads out into a broad estuary, which is the harbour known as Plymouth Sound. Here are the towns of Plymouth and Devonport, with a great dockyard for the Navy. A breakwater of huge blocks of stone has been built across the mouth of the Sound, in order

to prevent the Atlantic waves from entering the harbour. Ships come in by openings on either side, between the breakwater and the coast.

Cornwall is not quite like the other counties of England. This you may learn from the fact that not very long ago Cornish people used to

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FIG. 115.—ON PLYMOUTH BREAKWATER.

say, when they crossed the Tamar into Devon, that they were going to England. The syllable "wall" at the end of the name Cornwall means the same as the word "Wales." To call a man Welsh in the language of the Saxons meant that he was a foreigner.

The people of Cornwall were Celts like the

FIG. 116.—SOUTH-WESTERN ENGLAND, PHYSICAL.

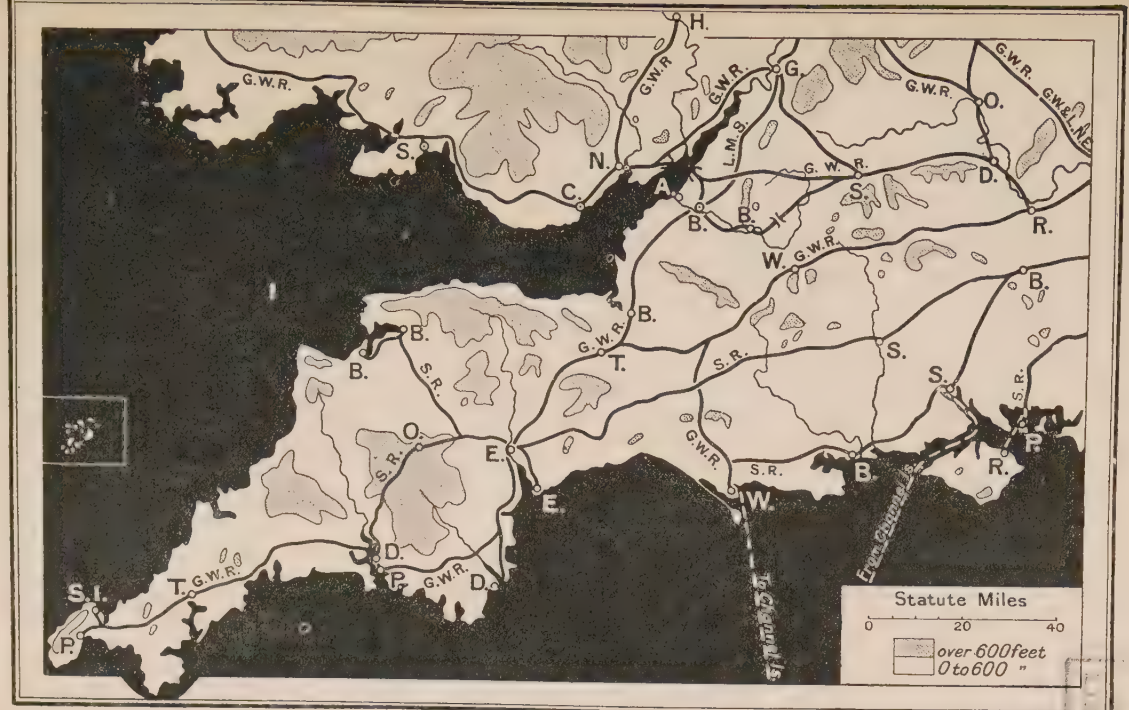

FIG. 117.—SOUTH WESTERN ENGLAND, RAILWAYS.

Welshmen. Their language was very like Welsh, and like the Breton language of Brittany. But the last person who could speak Cornish, an old lady, died about two hundred years ago. She must have found it very strange when there was no one left who could talk with her in her mother tongue.

If you look at the north coast of Devon, you will see a broad bay between two pointed capes. This bay has two names, for it is sometimes called Barnstaple Bay and sometimes Bideford Bay. Barnstaple and Bideford are two small ports at the heads of estuaries which flow into the bay. The sailors who were making for Barnstaple called the bay after their port, and those who were making for Bideford called it after their port.

You may learn from this fact the way in which the names of bays and gulfs have been given in most parts of the world. They were christened by the sailors. So, for example, we speak of the Bristol Channel, because at the head of it is the great seaport of Bristol. Ships in the Bristol Channel were mostly bound for Bristol, until Cardiff grew in recent years to be a large port also.

Exmoor is the high ground which runs from Bideford Bay eastward into Somerset. The river Exe rises close to the Bristol Channel and flows, like the Tamar, right across the peninsula to the English Channel. At the head of its estuary is

Exeter, and at the mouth is Exmouth. The river Dart has in the same way given its name to Dartmoor and to the town of Dartmouth.

Very anciently, before there were any large cities in the country, the Celtic Britons lived in the West of England. The word "Exe" in their language meant simply "water." No doubt the farmers often spoke of driving their cattle to drink at "the water." When the English came into the country and asked the name of the river, the Celtic farmers replied in their own language that it was "the Exe," or "the Water." The English, however, who were travellers and had seen many rivers, called it "the Exe River," to distinguish it from the Severn and other rivers.

Now let us go a little farther north-eastward. The peninsula of the West of England no longer consists of a single county going right across it, as do Cornwall and Devon. It is divided between two counties, Somerset and Dorset, so that the north coast belongs to Somerset and the south coast to Dorset. Dorset we leave to the chapter on the South of England, and we will speak now only of Somerset.

The middle of Somerset, from the Bristol Channel inland, was a great marsh, called Sedgemoor. Sedge is the name of a common marsh plant. The marsh has now been drained and turned into rich green meadows.

Sedgemoor ends at the foot of the Mendip Hills, which rise, like a wall, across the north

of the county (Fig. 116, p. 206). Beyond the Mendips we find the river Avon flowing north-westward, in a direction parallel with the Mendip Hills. The dictionary will tell us what the word "parallel" means.

The tides of the Bristol Channel are very high, as we learned in Chapter VII of this book. They

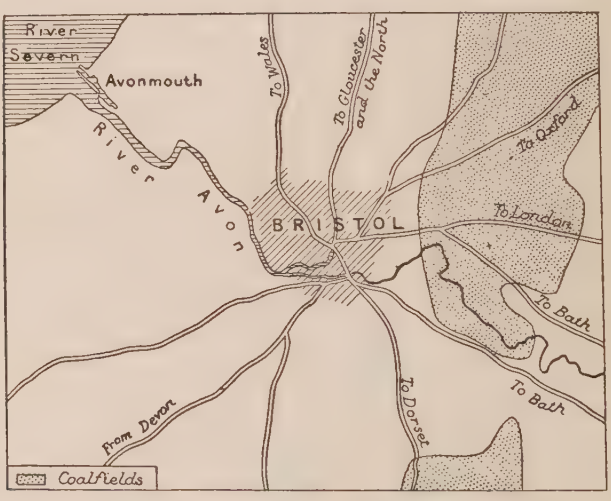

Fig. 118.—The Port, Bridge, and Coalfield at Bristol.

enter the mouth of the Avon and run some way up. It is for this reason that Bristol has been able to grow into a great port, although the Avon is only a small river.

The word Bristol used to be written Brig-stow, which meant "the bridge place," because here the roads coming out of Devon and Cornwall were carried by a bridge over the Avon. Thus

we see that Bristol became important for two reasons. It was a bridge place, and was also at the head of the tideway. In modern times the

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FIG. 119.—THE MALVERN HILLS

Avon below Bristol has been deepened to admit our large ships. Even so, some of the largest vessels cannot go up as far as Bristol, but stop at Avonmouth.

There is yet another reason for the importance of Bristol. The long peninsula of the West of England has no coal, but near Bristol, on both sides of the Severn, there are coalfields. The head of the Bristol Channel is, in fact, surrounded by coalfields, in South Wales as well as near Bristol. Therefore we find here no fewer than

four large ports, Swansea, Cardiff, Newport, and Bristol. Small vessels go up even to Gloucester.

The Severn and its beautiful tributary, the Wye, rise high on the broad moor of Plynlimon, and pour through Wales in deep valleys. From the edge of Wales they wind peacefully across the rich lowland plain of England, where the red Herefordshire cattle graze, and apples and hops are grown. They pass the ancient cities of Shrewsbury, Worcester, Gloucester, and Hereford, and then enter the Bristol Channel amid the smoke of South Wales, the Forest of Dean, and Bristol (*see* Figs. 116 and 121).

CHAPTER XXIX. THE MIDLANDS OF ENGLAND

We have now travelled through all those parts of Britain which contain mountains. From the Peak of Derbyshire we went northward past the Pennine Chain and the Lake Mountains into Scotland. Then we crossed over into Ireland, and so came to Wales and the West of England. But you will remember that in order to reach Derby our foreign friend, who landed at Dover, had to make a long journey through London and across the whole width of the undulating and cultivated English plain.

Look at Figs. 121 and 160, and try to imagine yourself standing on the eastern heights of the Welsh mountains. England lies at your feet. Down below you are green meadows and golden cornfields, spreading away eastward to the horizon. Beyond the horizon you may picture them still spreading on, until at last they end in a line of white surf, where the waves break along the sandy coast of the North Sea.

If you stood on the Derbyshire Peak and looked southward, the same rich country would extend before you until it ended on the shores

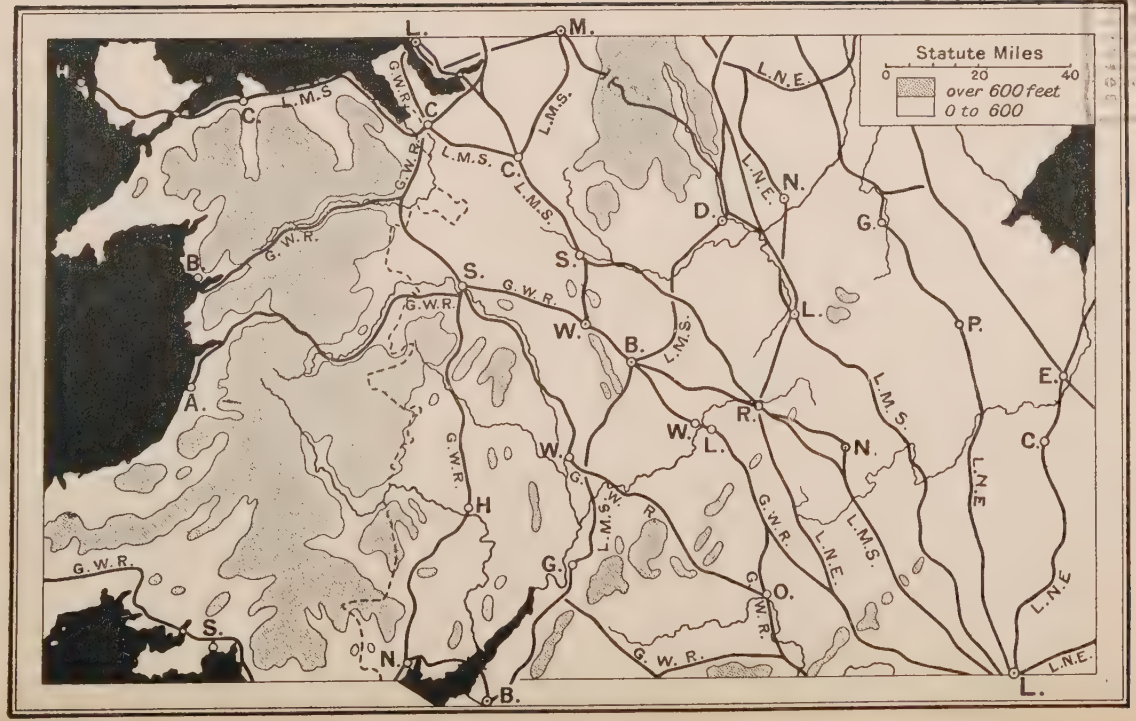

Fig. 120.—Central England, Railways.

FIG. 121.—CENTRAL ENGLAND, PHYSICAL.

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of the English Channel. Except a few summits in the west, among the Mendip, the Cotswold, the Malvern, the Wrekin, and other hills near Wales, there is no height in all the English plain more than 1,000 feet above the sea. Here and there is a small common or heath, but as a rule every acre is cultivated or planted with valuable trees, and there are several hundred towns and several thousand villages. What a contrast to the broad sterile tracts of the Pennine Moors and the Welsh Uplands!

FIG. 122.—THE MIDLAND COALFIELDS.

Let us measure the breadth of the English plain from Wales eastward, and from the Peak southward. It covers more space than the whole of Scotland or the whole of Ireland. Note on the map how few are the hills in this plain which rise even to 600 feet above the sea level.

The heart of the English plain is known as the Midlands, for it occupies the centre of England. At the four corners are four ports, London, Bristol, Liverpool, and Hull, and in the midst is the great city of Birmingham. But there is one very remarkable difference between the north-west and

the south-east of the Midlands. In the north-west, in the triangle between Bristol, Liverpool, and Hull, there are coalfields, but in the south-east, in the triangle between Bristol, London, and Hull, there is very little coal. All the Midlands are agricultural, but only the north-western parts have coal and great industries.

Fig. 123.—The Black Country.

In the neighbourhood of Birmingham, you may see on the map two large rivers, Trent and Severn. The one rises in a corner of the Peak District, but the other in the midst of Wales. At first the Severn flows towards the Trent, then for a short distance they flow in the same direction, and finally go away from one another. The Trent

goes to its mouth in the Humber estuary, but the Severn to the Bristol Channel. Where they turn away from one another, the Severn receives a large tributary from the north-east, which is called the Avon. This is not the Bristol Avon, but another river of the same name, which flows past Warwick, and is therefore called the Warwick Avon.

You will see in Fig. 122 that the Trent, the Severn, and the Warwick Avon make a triangle of rivers. Many important towns stand on their banks, but Birmingham does not. On the Severn we have Shrewsbury, Worcester, and Gloucester. On the Avon we have Rugby, Leamington, Warwick, and Stratford. The poet Shakespeare was born and died at Stratford-on-Avon. On the Trent and its tributaries are Stafford, Derby, Leicester, and Nottingham. But Birmingham is placed on higher ground away from the river banks.

Birmingham is just inside Warwickshire, but lies near the end of the coalfield of South Staffordshire. At the other end of this coalfield is Wolverhampton, and between Birmingham and Wolverhampton is the Black Country, teeming with people and black because the smoke of the factories kills the vegetation. There is a whole group of towns in the Black Country, but Birmingham and Wolverhampton are the largest.

At the other end of Staffordshire, on a part of the plain rising to the foot of the Peak, is the

Fig. 124.—Stratford-on-Avon.

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North Staffordshire coalfield, and upon this is a group of towns, of which Stoke and Hanley are the chief. These towns are engaged in the making of earthenware, and the district is therefore described as the Potteries.

The best kind of clay, called kaolin, is used for making china ware. It is the soil produced by the decay of the rock known as granite. There is much granite in Cornwall and Devonshire, and kaolin is brought by ship from those counties to the Mersey, and is then carried by barges through canals to the Potteries.

A broad arm of the Midland Plain extends between the Welsh Uplands and the Peak to the south-eastern corner of the Irish Sea. This low passage between Wales and the Peak is known as the Midland Gate. It is of great importance. Think how costly railway traffic between London and Liverpool would be if the Moors spread right across from the Peak into Wales. Two of the most important railways in England, the London, Midland and Scottish and the Great Western, pass by almost level lines through the Midland Gate from London in the direction of Liverpool and Manchester. As you travel through Cheshire on a clear day, you may see across the plain to your right hand the Pennine Hills, and to your left hand the Welsh Hills (*See Fig.* 121).

That part of the plain which lies in Cheshire receives much moisture from the neighbouring

sea. It has, therefore, very rich meadows and supports many cattle. Every one has heard of Cheshire cheese. But the wealth of Cheshire consists not only of grass and cows. Beneath its rocks are thick beds of salt.

Rain water sinks down through the rocks to the salt, and the brine which it forms by dissolving the salt is pumped up to the surface. The water in the brine is then evaporated by heat, and the salt remains.

In this way large masses of salt are gradually removed from beneath the plain, and hollows are left and the surface often falls in. In some of the towns of this district traces are to be seen of the ruin caused by the sinking of the ground. The houses and chimneys are tilted in all directions. Even the floors of the houses are not level, and occasionally the tall chimney of a factory collapses. None the less, people go on pumping out the brine, because the salt is valuable.

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FIG. 125.—LINCOLN CATHEDRAL.

CHAPTER XXX. THE EAST OF ENGLAND

From the Vale of York south-eastward to Norfolk and Suffolk is the lowest level of the English plain. It is lower even than the central plain of Ireland. This district is known as the East of England. Its coastline is broken by two great estuaries, the Humber and the Wash. It consists of the large counties of Suffolk, Norfolk, and Lincolnshire, together with the East Riding of Yorkshire, and a group of smaller counties round the head of the Wash (Figs. 126 and 155).

The district south and west of the Wash is a remarkable tract of land as level as a table. It is known as the Fens, and extends from the Wash halfway to London. To the east is the slightly higher ground of Norfolk and Suffolk.

The Fens are crossed in straight lines by drains, which are little less than rivers in size, and are contained by high green banks. There are no hedges, but countless ditches in their stead, which are marked by long lines of sedge waving in the wind. The trees are few, except the pollard willows. The remote horizon, the dome of the sky, and here and there a homestead, form the rest of the landscape. On bright summer days

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FIG. 126.—EASTERN ENGLAND, PHYSICAL.

FIG. 127.—EASTERN ENGLAND, RAILWAYS.

there is often a certain grandeur about this country, because of the far-spreading sea of crops and meadow.

At one time the Wash must have extended over all the Fens, but the sea has been banked out, and the marsh which was left has been drained. The

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FIG. 128.—A VIEW IN THE FENS NEAR SPALDING.

soil is black and very fertile. It grows the finest root crops, such as mangolds and turnips, for the fattening of sheep.

In the midst of the Fen Marshes is a low hill known as the Isle of Ely. Ely Cathedral is built on this hill, and can be seen from far over the great level.

There was a similar marshy district, though not

so large as the Fens, round the head of the Humber. It was known as Hatfield Chase, but has now been drained like the other marshes of England, such as Solway Moss round the head of Solway Firth, and Sedgemoor in Somerset. In the Humber marshes is a low hill known as the Isle of Axholm,

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FIG. 129.—FISH AT GRIMSBY.

in the part of Lincolnshire which lies beyond the Trent.

These marsh-lands are now some of the most productive parts of our country, but they are liable to be flooded, for they lie below the level of high water, and the banks of the rivers sometimes burst in times of great rain or very high tide, especially if their repair has been neglected.

The rest of the east of England is the chief wheat and barley district of Britain. These

crops are grown elsewhere, but not over so wide a space as here.

This is because of the climate of this part of the country, which is quite different from the climate of Ireland, and very different also from the bleak climate of the hilly districts of England. The largest markets for English wheat and barley are at Norwich, Peterborough, Lincoln, Ipswich, and London.

Just across the North Sea, which is here narrow, lies the kingdom of Holland, and thence the Continent spreads eastward for several thousand miles without any sea to supply moisture to the air. Therefore the east wind does not bring much rain to Norfolk. Most of the rain comes with the west and south-west winds, but these have had to cross the whole breadth of England, and if they blow exactly from the west, have had to cross Ireland as well. Therefore they have lost much moisture on the way.

The greenness of Ireland is due not only to its abundance of rain, but also to its mild winters and cool summers. Here in the east of England, far away from the great Atlantic, the summers are comparatively hot and the winters cold. It matters not to wheat and barley if the winters be cold, provided the summers be hot and dry. Therefore it is that most British wheat and barley are grown in the east of England.

We do not grow all the wheat that we require

for our large population, but we used to grow much more than we do now. In the last thirty or forty years men have learned to build very large steamers which carry grain cheaply, and therefore we bring four-fifths of our wheat from certain lands across the ocean. These lands have climates better suited for the growing of wheat than the climate of the west and north of Britain.

In addition to wheat and barley, the Eastern Counties have great fisheries. Many of the boats which fish upon the Dogger Bank remain at sea for days together. The fish is collected from them by rapid steamboats, and brought to Grimsby, Yarmouth, and Lowestoft, whence express trains carry it, while yet fresh, to London and to the great manufacturing towns of the North and Midlands of England. Of late the fishing boats themselves have been fitted with steam, and therefore return more frequently to port.

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FIG. 130.—STONEHENGE.

CHAPTER XXXI. THE SOUTH OF ENGLAND

THE part of the country which lies south of the Thames is known as the South of England, although it does not lie so far south as the peninsula which is called the West of England. The South of England contains seven counties, Kent, Surrey, Sussex, Hampshire, Berkshire, Wiltshire, and Dorset.

It is one of the most interesting parts of Britain, because it approaches nearest to the Continent, and throughout our history has had most to do with foreigners. But to-day Liverpool also sees much of foreigners, because there is now a great traffic on the ocean, as well as on the narrow seas.

The South of England is a part of the English plain. It has no mountains, yet is not quite

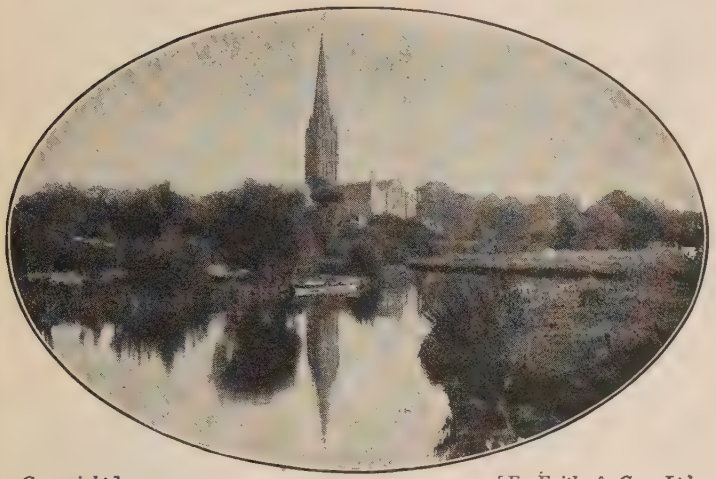

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FIG. 131.—SALISBURY CATHEDRAL.

flat like the Fens. Low lines of hill cross its surface, and some of its districts rise a little above the general level and form low tablelands. In the county of Wilts there is a tableland of this kind, known as Salisbury Plain. It spreads for many miles, and is made of chalk.

The rain which falls on Salisbury Plain sinks down through cracks in the chalk, so that the ground is dry, and is covered with short grass, fit only for sheep.

On this lonely tableland stands the remarkable monument of Stonehenge, a circle of huge stones, each two or three times as high as a man. It was built probably for a temple by some ancient race now forgotten, for we have no written record

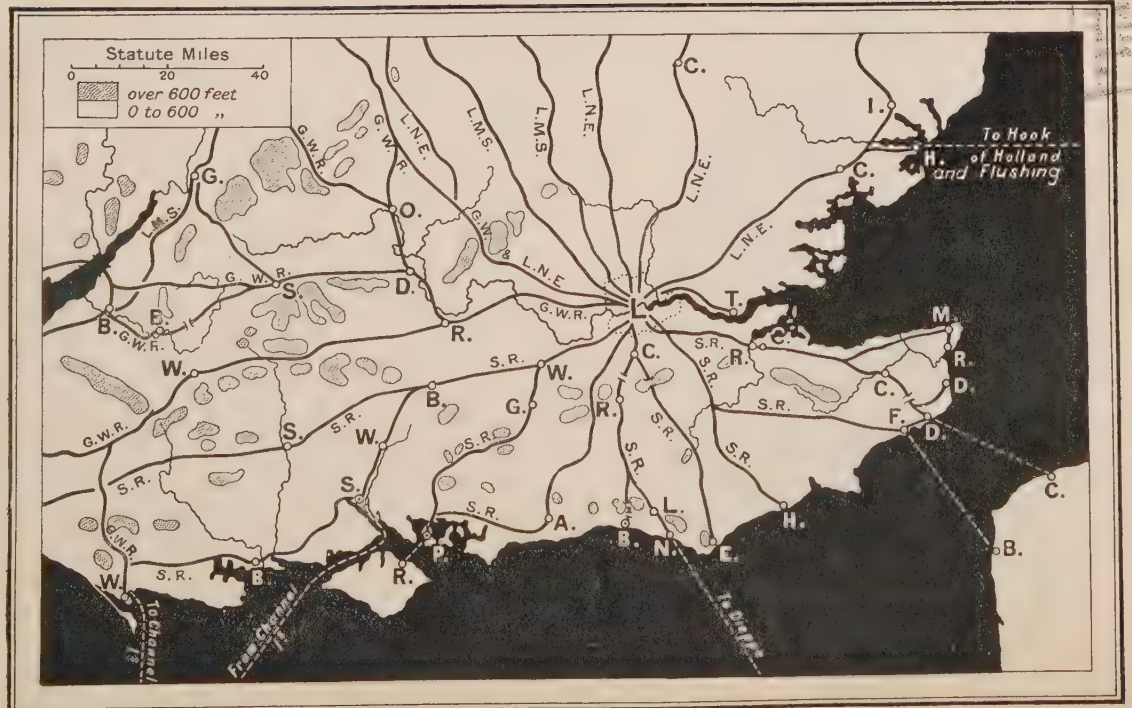

FIG. 122.—SOUTH E[illegible] E[illegible] P[illegible] IS

FIG. 133.—SOUTH-EASTERN ENGLAND, PHYSICAL.

about it. The city of Salisbury, with its beautiful cathedral, stands down in a valley, with the chalk tableland rising on either side.

This low chalk tableland spreads from Wiltshire into the north of Hampshire, where the city of Winchester stands in another valley. Then it divides into two ranges of chalk hills, known as the South Downs and the North Downs.

The South Downs extend through Sussex, and end in the white chalk cliffs of Beachy Head. The North Downs run through Surrey, and then through Kent, to the white chalk cliffs of the South Foreland, near Dover.

The chalk of the Kent Downs disappears northward under clays and sands, but reappears again in the Isle of Thanet, where it forms the white cliffs of the North Foreland. Therefore as you steam along the south-east coast of England you pass round three white headlands, the North Foreland, the South Foreland, and Beachy Head.

The Isle of Thanet is now part of the mainland of England, but in Roman times a sea strait cut it off from Kent, and it was then a real island. Ships coming from France to London passed through this strait, and not round the North Foreland. But the strait has since been silted up by the Stour, the little river which flows past Canterbury.

Between the North and the South Downs, in the counties of Surrey, Kent, and Sussex, there is a

broad district, hilly in the centre but level in many parts, which is called the Weald. This word in the language of the Saxons meant "Forest," and to-day if you look southward over the Weald from the top of the North Downs, or northward from the top of the South Downs, you still see many trees. In the summer, when they are leafy, the Weald might from a distance yet be thought a forest.

Only two hundred years ago the chief iron manufactures of England were in the Weald, for

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FIG. 134.—A KENTISH HOP GARDEN.

there is much iron ore in the Wealden hills, and the forest around supplied charcoal for fuel. In those days men had not yet learned how to smelt iron

with coal. The palings round St. Paul's Cathedral in London were made of Sussex iron.

Hop gardens are another striking feature of the Weald. In the middle of summer, just before the hops are gathered, they are very beautiful. Whole fields are thickly covered with hop vines, twining up posts to more than the height of a man, and crossing from post to post upon strings. From outside the whole field looks to be one solid block of green, through which there run leafy tunnels.

At the east end of the Weald, along part of the low coast between the South Foreland and Beachy Head, is Romney Marsh, a flat district which was long ago drained, and now supports many sheep. A shingle beach has been heaped up by the waves along the front of Romney Marsh, in such a way that it stands out from the coast as a low promontory, called Dungeness.

The land is here so low that as you approach it in a ship you often cannot see it, and the church towers and the lighthouse at the end of Dungeness appear to rise out of the sea. Therefore, although Dungeness looks upon the map to be something like the North and South Forelands and Beachy Head, it is really very different.

Out at sea, off the east coast of Kent, are the Goodwin Sands, once an island, but now covered at high tide. Ships are sometimes wrecked upon them in stormy weather.

Between the Goodwin Sands and the coast of

Kent there is a sea passage, which is never very rough, even when the east wind blows, because the waves break on the Goodwin Sands. This passage is called the Downs, and when the winds are contrary, sailing ships often anchor here.

Formerly, when the war fleets of England were

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FIG. 135.—BEACHY HEAD.

driven by wind and not by steam, the Channel Fleet often lay in the Downs, and took orders from the Admiralty in London through Deal, which is a town on the coast of Kent between the North and South Forelands.

There is a third range of chalk hills, branching from Salisbury Plain. This range curves through

the west end of Dorset, and then runs eastward along the south coast, to form a white promontory, Purbeck, projecting towards the Isle of Wight. The range is continued through the Isle of Wight, which it crosses completely, so that both the west and the east capes of that island are

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FIG. 136.—THE NEEDLES.

cliffs of white chalk. Off the western cape are some celebrated chalk rocks, known as The Needles.

The Isle of Wight is a fertile spot, and is therefore often described as the Garden of England. It has a warm bright climate, especially in the south, and is resorted to by invalids. Unlike Thanet, the strait which separates the Isle of

Wight from the mainland has not been silted up. This strait is known as the Solent. There is quiet water between the Isle and the mainland, so that merchant ships have calm access to the commercial port of Southampton, and the Navy is able to lie at the Spithead anchorage off the dockyard of Portsmouth.

Near the western end of Dorset a great cliff-edged hill rises like an island from the sea. This is the Isle of Portland. It is made not of soft chalk, but of a building stone called Portland stone. Portland is now no longer an island, but is attached to the mainland by a shingle beach, like the beach of Dungeness.

Under the lee of Portland is Weymouth, a pleasure town by the seaside, and also a port from which steamers run nightly to the Channel Islands. These islands belong to Britain, though they are off the coast of France.

We say that Weymouth is under the lee of Portland, because it lies at the north-eastern foot of the hill, and is thus sheltered from the storms which drive up the Channel from the Atlantic. A great breakwater has been built upon the bed of the sea at Portland, like the breakwater at Plymouth, and behind this the Fleet may anchor in a safe harbour.

East of the Isle of Wight the seaside towns succeed one another right round the coast to the Thames estuary. Some of them are pleasure resorts for the people of London, and others are

ports from which the steamers cross the Channel to France and Belgium. By far the largest of them is Brighton, but Eastbourne, Hastings, Folkestone, Dover, Ramsgate, and Margate are all important. The greatest number of the Continental passengers leave and enter by Dover, because the sea passage is there shortest.

There is a large harbour at Dover. Two piers have been built out from the shore, and a breakwater has been made between their heads, so that two entries are left (*see p.* 31). Dover has thus become an anchorage for the Fleet, like Portland and Plymouth. It is also a calling place for oceanic steamers, like Queenstown in Ireland, and Southampton and Plymouth in England, and Fishguard in Wales.

CHAPTER XXXII. THE THAMES

If you stand high on the western brink of the Cotswold Hills in Gloucestershire, you see a broad fertile valley several hundred feet below you. Twenty miles away to the west, on the far side of this valley, is the beautiful jagged outline of the Malvern Hills, and midway you may often detect the silvery bends of the Severn River. Behind the Malverns, in very clear weather, is the dark edge of the Welsh Mountains. All this you may imagine from your map, if you find the Cotswold Hills.

Now turn your back on the western landscape, and walk for a mile or two over the flat top of the Cotswolds, till you come to little rills of water flowing eastward. These are the sources of the Thames. They begin in springs where the water bubbles up from the ground. You must remember that all the rainwater does not flow off the surface of the land, but some of it filters down, and having journeyed for a time underground, rises again here and there as a spring. Even in dry weather the springs keep the river supplied. The spring water fell as snow and rain perhaps months beforehand.

Copyright.] [Taunt, Oxford.

FIG. 137.—WESTWARD VIEW FROM THE COTSWOLD HILLS.

The little streams join together into larger and larger channels, and at last gather into the river Thames. The river then flows through the lower country beyond the eastern edge of the Cotswolds. Where the Cherwell tributary enters is the city of Oxford (Fig. 152, p. 270). The syllable

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FIG. 138.—SOURCE OF THE THAMES IN THE COTSWOLD HILLS.

Note the walls roughly built of limestone. The Cotswolds are formed of limestone. Such walls take the place of hedges in many hilly parts of Britain.

"ford" at the end of the name tells you that in early days, before the Thames had been deepened by locks, and before there were bridges, there was a ford here, or shallow place with a firm bottom, by which men crossed over between north and south.

Many paths led to the ford from all the country round, and the place was therefore convenient

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FIG. 139.—HIGH STREET, OXFORD.

The buildings to right and left are two of the colleges.

for a market. To supply the needs of travellers, and of the market people, a village grew up beside the ford, and presently became a small town. Later, because the times were rough, a wall was put round the town. Then tradesmen from far and wide sought security within its bounds, and

Oxford became a city. Being placed upon the Thames, it could be reached by boat from London. In a time when there were no good roads this was a very important fact. In some such way as this Oxford was founded and grew.

At a later time it happened that the schools of Oxford became very famous, and joined together to make a University, which has continued until our own time. The University buildings have been made more beautiful in each succeeding

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FIG. 140.—KING'S COLLEGE, CAMBRIDGE.

generation. The other old University of England is Cambridge, at the southern point of the Fens,

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FIG. 141.—WINDSOR CASTLE.

due north of London. The one was the University of the West, and the other of the East.

Below Oxford the Thames passes by a gap, like that of the Shannon at Castle Connell, through a range of chalk hills, known as the Chilterns. These hills run north-eastward towards Suffolk from Salisbury Plain. You see, therefore, that Salisbury Plain is like the palm of a great hand, from which four fingers run out, the first through Dorset and the Isle of Wight, the second through the South Downs, the third through the North Downs, and the fourth through the Chiltern Hills. But there is no thumb.

East of the gap in the Chiltern Hills is the town of Reading, where the Kennet tributary joins the Thames, and a road and a railway from the Kennet valley enter the main valley. Then we come to Windsor, where there is the King's castle, placed on a hill beside the river (*Fig.* 141).

At last we approach the vast metropolis of London, through the midst of which the Thames flows in a channel that is broad and tidal. Below London on the south bank is Greenwich, where is the famous Greenwich Observatory for the study of the stars. Below Greenwich is Woolwich, with the great arsenal where the guns are made for the Navy and Army.

The Thames is nearly a mile broad where it passes Gravesend, and here the ships wait for the tide which is to carry them up to London. It is a fine sight to see them anchored just before the

tide turns. There are often as many as seven hundred vessels, large and small, which pass Gravesend, upward and downward, in the course of a day.

Finally we reach the Nore Lightship, where the river broadens out to the sea, and here its largest tributary, the Medway, comes in from the south. The mouth of the Medway is a harbour, which is utilized at Chatham for the fourth great dock-yard of the Navy. You will remember that the other three are at Rosyth, Portsmouth, and Devonport.

Although the Thames is but a small river when compared with the rivers of the Continent, yet on account of the considerable rise and fall of the tide, it has a large estuary, which serves London for a harbour. The tide runs up for more than sixty miles to Teddington, and rises and falls more than twenty feet at London Bridge.

In Fig. 152, p. 270, we see the Thames basin. A line may be drawn round it in the same way as round the basin of the Yorkshire Ouse. You will remember how that was done when we were reading Chapter IX of this book.

This map shows you very plainly the gap in the chalk hills through which the Thames flows, between Oxford and Reading. Do you see, moreover, how the tributaries come to the Thames out of the Weald by a number of gaps in the North Downs? The roads gather to these gaps to pass through them, and so avoid the toilsome climb

over the hills. Market towns, such as Guildford, and Dorking, and Maidstone, have grown up at the junctions of these roads, for the same reason that Oxford grew where the roads gathered to a ford across the Thames. Do you remember how Inverness and Aberdeen became large towns? Is there, do you think, any town in your neighbourhood which has grown in a similar way?

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FIG. 142.—WESTMINSTER FROM THE RIVER.

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CHAPTER XXXIII. LONDON

HAVE you ever thought what London must have looked like before the houses were built? Look at Fig. 143. Do you see how the Thames flows from Fulham to Woolwich, making great bends, but keeping on the whole an easterly course? It swings from side to side of a broad valley, whose edges are marked on the map by hill shading. If you measure it, you will see that this valley is two or three miles across.

The bottom is flat, and was once marshy, and all covered with green reeds and tall grass. In the old days a sudden fall of rain in the hills, or a high tide from the sea, was enough to flood the whole of it.

Look again at Fig. 143, and notice a rather narrower valley coming from the north, which also had a marshy bottom, with the more solid ground rising on either hand. The river Lea, a tributary of the Thames, flows through this strip of marsh. Let us measure the breadth of the Lea Valley.

All the ground not shown as marsh on Fig. 143 is raised a little above the valleys of the Thames and Lea, and most of it was clothed with trees.

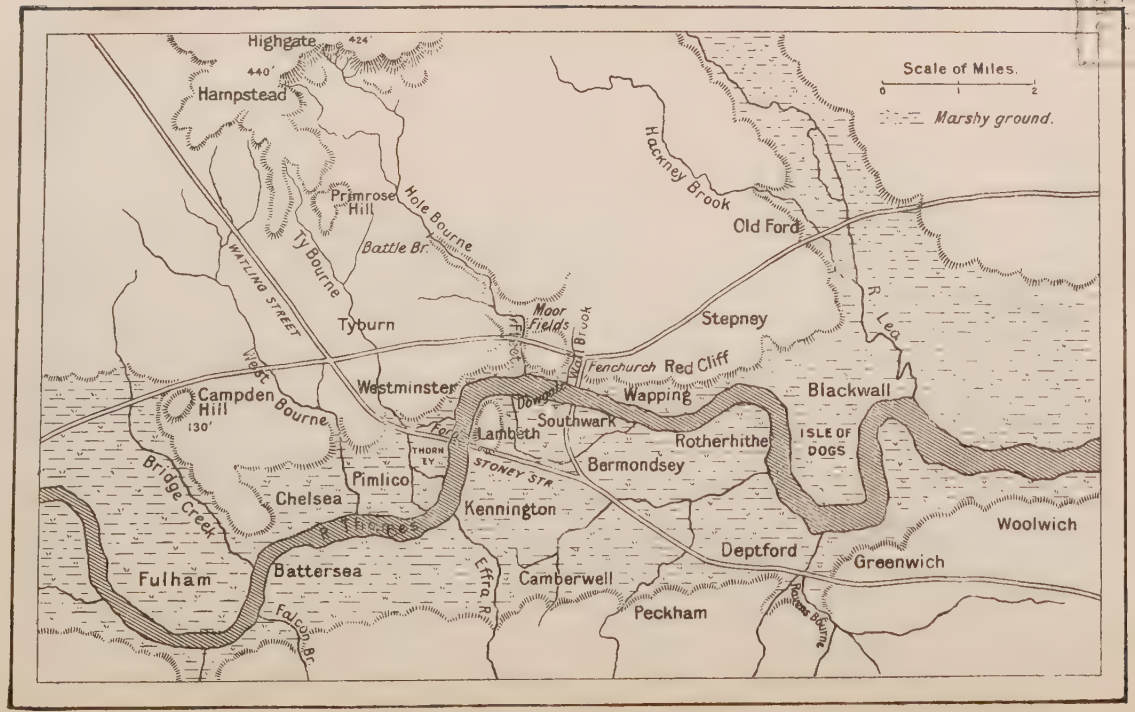

FIG. 143.—LONDON BEFORE HOUSES WERE BUILT.

We still have remains of these woods in Epping and Hainault Forests, east of the Lea. There were once bears, and wolves, and wild oxen, and deer hiding in the green glades.

If you look now at Fig. 145, you will see some traces of this old London before houses. Do you notice the spaces labelled "park"? These are pieces of the open country which have never been built upon. London has gradually spread round them. Measure the length and breadth of Hyde Park in Fig. 146.

Then turn back to Fig. 145, and notice the shaded area. It shows the extent of the houses and streets. Do you see that there is very little building in the Lea Valley? That is because of the marshy nature of the ground. West Ham and Leyton have been built beyond the marsh, in Essex. But in the centre of London the land was too valuable to be left vacant, even though marshy, and Southwark, on the Surrey side, was built on ground which was liable to flooding.

In Fig. 145 the docks are shown, opening from the river. There was not space enough to put their names into the map, but if you live in London you can easily find them on a map of a larger scale. Compare Figs. 145 and 143, and you will see that the docks have all been made in the soft marshy ground at Wapping, at Rotherhithe, in the Isle of Dogs, and in Essex beyond the Lea. It is the same with the Tilbury Docks opposite Gravesend.

Thus, if you think carefully, the parks and docks of London will tell you what the country was like on which London was built.

Look at Fig. 143 again, and imagine yourself on Greenwich Hill on a fine Sunday in the summer. We choose the summer and a Sunday, because there are then fewest smoking chimneys, and the air is often clear. At the bottom of the hill is the bright, broad river coming to you, and then going away again as it rounds the Isle of Dogs. Away to the north-east are the dark hills of Waltham Forest, and northward is the valley of the Lea.

North-westward spreads out all London. In the middle distance, beyond several miles of houses, are the Tower Bridge, the dome of St. Paul's Cathedral, and the towers of Westminster. Behind these, as you see from Fig. 143, are hills more than 400 feet high. The little mark ′ behind the numbers is a short way of writing "feet."

Now I want you to think about these hills in the north-west of London. But first measure how far they are from Greenwich, and remember that there are now houses all the way. From the top of Hampstead Heath, the highest of these north-western hills, you may look across London to the dome of St. Paul's and the towers of Westminster. Away on the Surrey Hills beyond is the Crystal Palace sparkling in the sunshine.

Hampstead Heath is a hill made of sand, and

was once covered, as its name tells you, with a low plant called heath, which is all purple with

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FIG. 144.—THE TOWER OF LONDON

bloom in the early autumn. There were also, no doubt, green ferns and golden gorse, but there were no trees.

Before London was built, this hill rose nakedly above the surrounding oak forests. The oak grows best on a clay soil, and London is built on clay. The bricks of its houses have been made from the clay. The great heap of sand which is called Hampstead Heath rests on the top of the London clay.

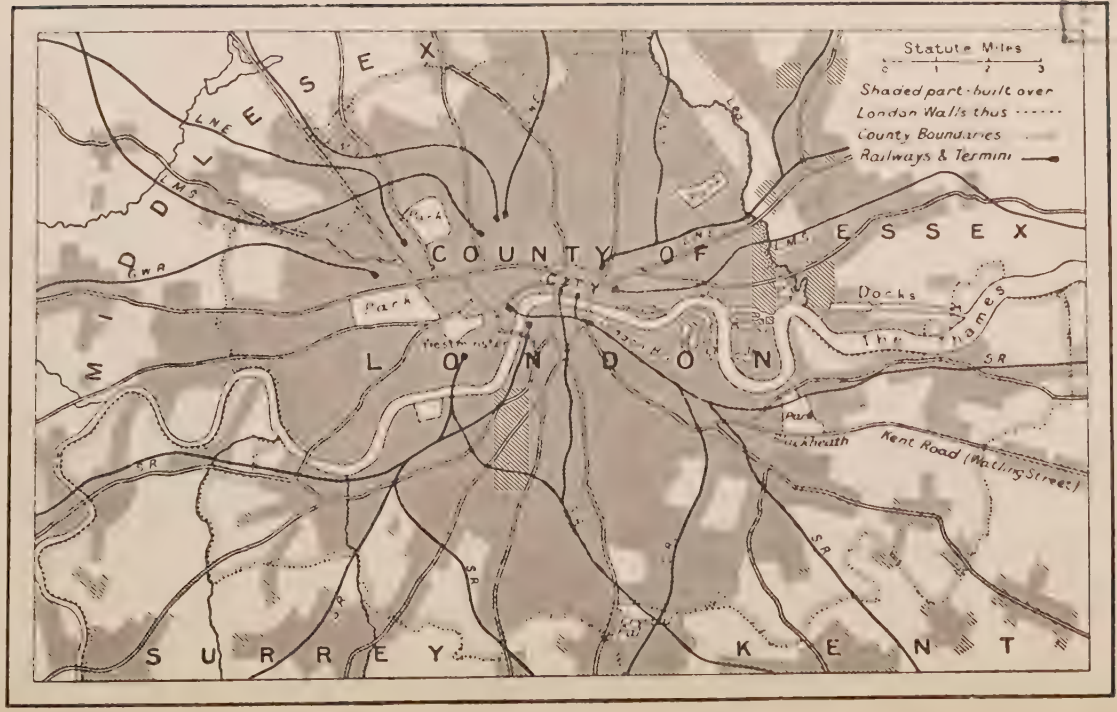

FIG. 145.—COUNTY OF LONDON.

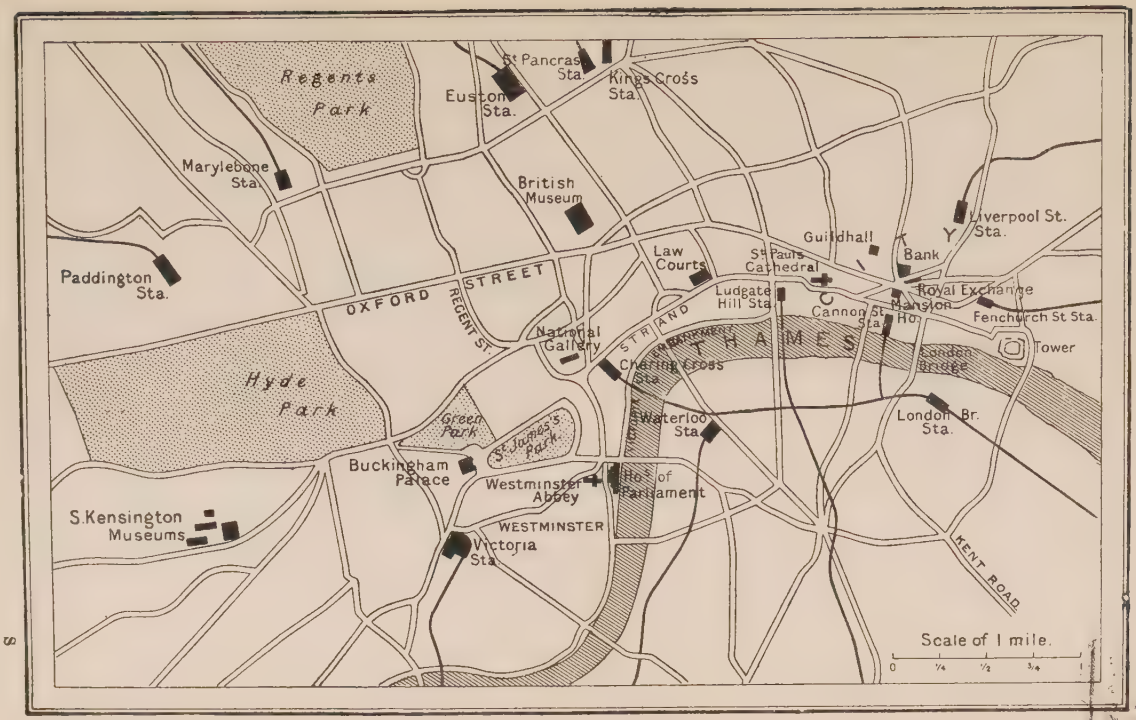

FIG. 146.—CENTRAL LONDON.

Do you see in Fig. 143 a number of streams rising in Hampstead and Highgate Hills, and flowing south-eastward to the Thames and the Lea? They are the West Bourne, and the Ty Bourne, and the Hole Bourne, and the Hackney Brook. They were just little sparkling brooks, flowing in little green valleys, winding through the forest.

The word "bourne" means "brook." You have it in Bournemouth and Eastbourne, which are towns on the south coast.

Why do these streams rise in the Hampstead and Highgate Hills? Have you not heard that in the waterworks which supply large towns the water is often filtered through layers of sand? But clay, through which water will not filter, is often used in the banks and bottom of the reservoirs. So the rain falls on Hampstead Heath, and filters down through the sand, until it comes to the clay. Then, because it can sink no more, it oozes out all round the hill in a line of springs. These springs fill the Hampstead and Highgate ponds, and flow away to the Thames in the little streams we have just named.

A wall was built across the valley of the West Bourne in Hyde Park, and the water of the bourne was made to fill the valley, so forming a lake called the Serpentine. The Ty Bourne was used for the lake in Regent's Park, and the Hackney Brook for the lake in Victoria Park.

But the most interesting of these streams was

the Hole Bourne, or the Holborn. Near its mouth this stream was called the Fleet, a word which comes from the verb "flow." You have, of course, heard the expression "fleet of foot." Look at Fig. 146. Do you see the straight road leading southward past Ludgate Hill Station to a bridge over the Thames? That road was built over the Fleet brook, which now flows under it in a tunnel or sewer. Fleet Street, leading from the Strand towards St. Paul's Cathedral, used to cross the Fleet brook by a bridge.

I want you to look very carefully at the ground shown just east of the Fleet on Fig. 143. You see that it is solid ground and not marshy, though it is close to the Thames bank. It is in fact a hill, and up this hill now runs the street called Ludgate Hill, to St. Paul's Cathedral which is on the top. Here, and for about a mile and a half eastward, the Romans built the City of London. In this position they had firm ground for the foundations of their houses, and water at hand to drink, and their ships could come close up to the city to unload, for there was no marsh just here between the river and the solid ground.

In later times a wall was built round London, the *City* of London on the hilltop by the Fleet and the Thames. We still have the streets which came through the gates in this wall. They are named Aldgate Street, and Bishopsgate Street, and Aldersgate Street, and Newgate Street, and

Ludgate Hill. Once you stepped outside the walls you were among the fields, and then you came to the woods.

Have you heard of the country boy, Dick Whittington, who ran away from the office of his master in London, and when he was tired and resting by the roadside, the bells of Bow Church spoke to him and said, " Turn again, Whittington, Lord Mayor of London " ? And he turned back, and in after years became a very celebrated Lord Mayor, Sir Richard Whittington. Bow Church is in the very middle of the City, but in those days its bells could be heard in green woods and by stream-sides, where now for several miles there spread the houses and streets of London.

The chief building of the walled city of London in the old times was the cathedral, a very large and beautiful church, with a tall spire like Salisbury Cathedral (Fig. 131, p. 231). But St. Paul's was burnt in the Great Fire of London two hundred and fifty years ago. The present cathedral of London, with a dome, was put up by a very celebrated architect, Sir Christopher Wren.

Other buildings of old London were the Guildhall, or Town Hall, and the Mansion House, where the Lord Mayor lives. You should find these buildings in Fig. 146.

London was not always the capital of England. At first the capital was at Winchester. It was there that our earliest Kings reigned. But afterwards, when London had grown by its trade to

be the largest city in England, it was found inconvenient for the King to live at a distance. So he came to live near London.

But he did not put his palace inside the walls, because the people of London were not always peaceable. A fortress was built to keep them in order, and this fortress escaped the Great Fire. We have it still, and we call it the Tower of London.

Two miles up the river, but on the same side as the City, there was an island in the marsh, which was called the Isle of Thorns, or Thorn-ey, for "ey" means "island." There the King built his palace, so that important people could come to him by boat from London, or he could go up the river to his castle at Windsor. You must remember that the roads were bad in those days.

Beside the palace was built a great church, the King's Church, and this men called the West Minster, to distinguish it from the East Minster, which was the cathedral of London. Thus it happened that the Palace was called Westminster Palace.

At first the whole government of the country was carried on in the King's palace at Westminster. The Houses of Parliament met there, and the chief judges gave law there. Afterwards as the population grew, and government was no longer a simple matter, more space had to be found. The King now lives at Buckingham

Palace, and new Courts have been built for the judges in the Strand.

The word "strand" means "shore." It was the shore road from London to Westminster.

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FIG. 147.—THE VICTORIA EMBANKMENT.

Now it is one of the busiest streets in London.

London has grown very large in the last two or three centuries. It spreads far beyond the old city. It has been made a separate county, and is managed by its own County Council. But as you will notice in Fig. 145, the houses have spread even beyond the county of London into the counties of Essex, Middlesex, Surrey, and Kent. There are four and a half million people in the county of London, but in the whole metropolis there are now more than seven millions.

Very few people except caretakers now sleep in the City, which was once the whole of London, but a great many men and women crowd into it to their work, every morning except Sunday,

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FIG. 148.—THE BANK OF ENGLAND.

and come away in the evening. In the City are the chief business buildings, the Bank of England, where the money of the Government is kept, and the Royal Exchange, where shipping business was formerly dealt with.

Of late London has grown so vast that its inhabitants have lost much time in getting from one part to another. There are many bridges over the river and some fine broad streets, but the throng is very great. Men are at last overcoming the difficulty by electric tramways

and motor omnibuses, and also by making tubes underground for electric trains.

These tubes are more easily made under London than under most cities, because London is built on the London clay, into which you can cut a hole almost as easily as you can through cheese. This is a very fortunate circumstance.

Finally let us not forget that London, because it is the capital, has the great privilege of housing the national collections for the study of art, literature, and science. In the National Gallery is one of the finest collections of pictures in the world. The British Museum has a library of more than a million books, and a splendid collection of sculptures brought from Egypt, and Greece, and Rome. The Natural History Museum at South Kensington has wonderful collections of stuffed animals and birds. In all parts, moreover, there are Free Public Libraries. All these places may be visited without payment. Surely it is a disgrace for any Londoner to grow up in ignorance.

CHAPTER XXXIV. THE METROPOLIS

Does it not strike you as curious, if you look at the map of the British Isles, that London, the capital or metropolis, should be in the far south-eastern corner ? Would it not seem more natural that the capital of the country should be near the centre—say at Liverpool ? Why is it, then, that London in the south-east has become the capital ?

Even if you take away Scotland, Ireland, and Wales, and leave only England, still London is not in the centre. Birmingham is far more central. How came it, then, that London is the capital of England ? To find the answer to this question, we must remember that the North of England contains the Pennine Moors and the Lake Mountains, and that there were very few people living in the North, until men began to use the coal which is found there to drive steam-engines.

Most of the people of England formerly lived in the great agricultural plain of the Midlands, the East, and the South. London is not so very far from the centre of this plain. Still, it is not quite in the centre ; the town of Buckingham

is nearer to that. Thus we are still left asking the question, "Why was London so early the most important town in England?"

The answer is to be found in the estuary of the Thames and in the promontory of Kent. In the old days people did not like crossing the sea. There were many pirates upon it. Moreover, contrary winds often carried ships out of the way. So they naturally chose the shortest passage, and every one who wished to go to the Continent rode towards the south-eastern corner of the country.

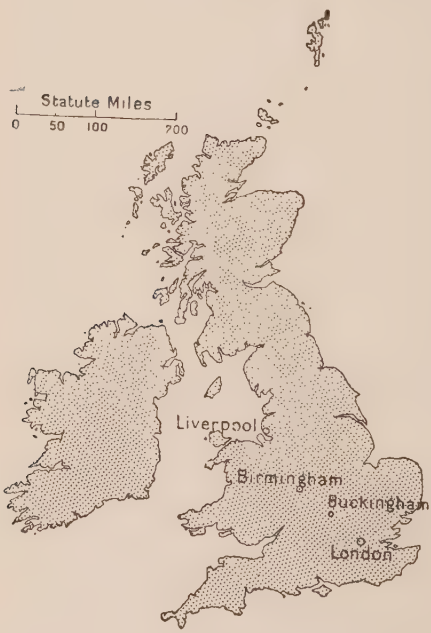

Fig. 149.—British Isles, Showing Position of London.

The river Thames had to be crossed on the way. It was a much more difficult matter to build a bridge then than it is to-day, so that men were content with fewer bridges. On the Lower Thames, until about 150 years ago, there was only one bridge below Kingston. It was called London Bridge.

The great road from the Continent, known as

Watling Street, started from Dover (*Fig.* 133). It crossed the river Stour at Canterbury, and the Medway at Rochester, and approached London over Blackheath, the common to south of Greenwich Park (*Fig.* 145). Then descending Lewisham Hill, travellers forded the little river Ravensbourne at Deptford, and followed a way through the green marshes, now a busy street called the Old Kent Road, until they came to the bridge.

From London Bridge roads branched into all the country beyond—north-eastward to Ipswich and Norwich, northward to Lincoln and York, north-westward to Chester and Carlisle, and westward to Bristol. South of London, beyond the North Downs, lay the great forest of the Weald, which travellers avoided, because of the robbers who sheltered there, and because of the badness of its muddy lanes. Even the road from the south-west, from Southampton, did not go direct to London Bridge, but crossing the Thames by a ford at Staines, approached London on the north side of the river. You should look all these places out, and draw the roads on a map. Then you will see why London became the chief city of England.

London Bridge has been rebuilt more than once. The older bridges had many small arches, not as at present, a few large ones. Therefore the ships which came up with the tide from the sea could not go beyond London Bridge, but had to discharge their cargoes just below it, in the part

of the river which is called the Pool. The goods were forwarded by the roads which spread out from the bridge into all the country round.

FIG. 150.—OLD LONDON BRIDGE.
Note the Tower, and the ships below but not above bridge.

These roads were also used to bring in the wool, and other agricultural produce, of the fertile plain of England, in the midst of which London was placed.

Thus London grew to be a great city for three reasons :

(1) It was on the tide-way of the Thames.

(2) It was at the lowest bridge over the Thames.

(3) It was surrounded by fertile country.

You may still see how the great roads led out from London. The road to Ipswich, for instance, once crossed the marshes of the Lea at Old Ford.

Afterwards it was diverted to Stratford, which means the Street-ford or paved ford, for the word street is got from a Latin word meaning a paved way.

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FIG. 151.—LONDON BRIDGE.

On the same road you will find the word Bow, because here was a bridge with an arch. You make a bow when you bend a ribbon to tie it.

Another way leading out of London was a continuation of the Kentish Watling Street, which must very early have crossed the Thames at Westminster by a Ford or Ferry (*Fig.* 143). The Edgware Road is part of this old Watling Street, which you may see on *Fig.* 133, striking across the plain of England towards the Irish Sea.

Still another way led southward from London

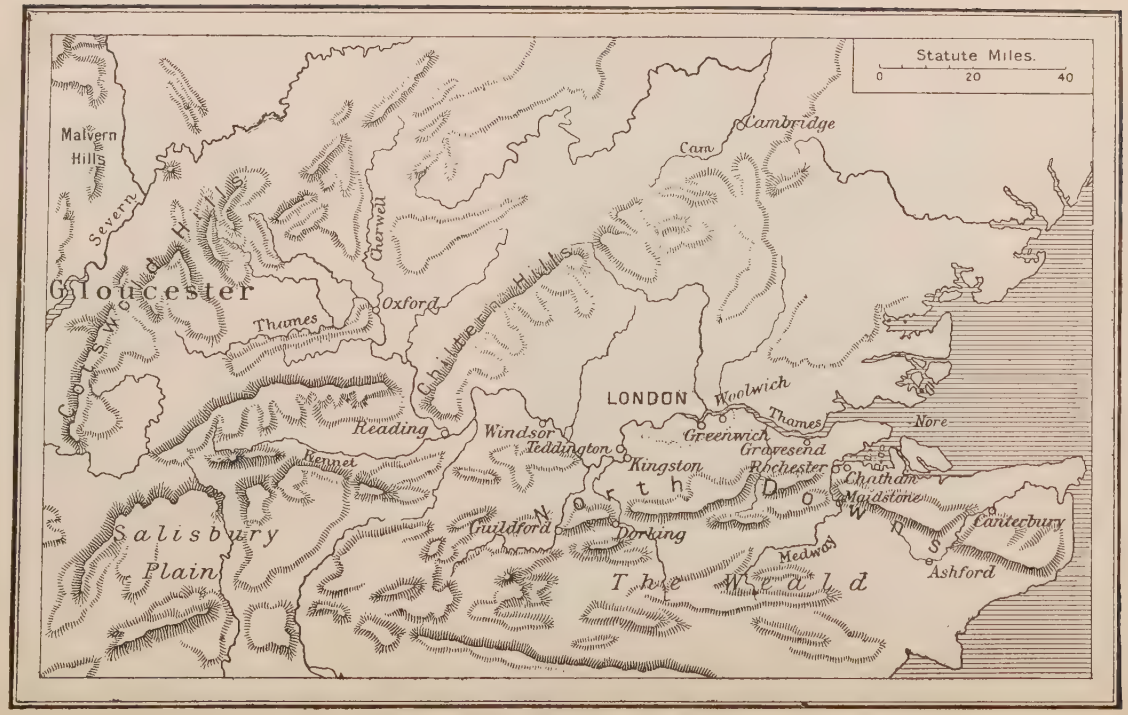

FIG. 152.—THE THAMES BASIN, PHYSICAL.

Fig. 153.—The Thames Basin, Railways.

Bridge, and crossed the marshes on the Newington Causeway. You will remember the meaning of the word "causeway" from our description of the Giants' Causeway.

The railways which radiate from London are now much more important than the roads, although of late road traffic has greatly increased again owing to the invention of motor cars.

Is the position of Edinburgh, in Scotland, or of Dublin, in Ireland, at all like that of London, in England?

CHAPTER XXXV. THE NAMES OF PLACES

We have now travelled right through Britain. We have seen something of each part of it. Let us consider lastly some things which concern the whole country.

The names of places are among the most interesting facts in geography. There are a good many names on the maps in this book, but if you look at a really large map of England, you will see some thousands of them.

If you live in the country, you know that every village round you has its own name, and if you live in a town, you know that every street has its name. These names are often much older than the houses now standing in the village, or in the street. One by one, the houses are pulled down and new houses are built in their place, but the name of the street generally continues, even though there be not one of the old houses left standing.

The name was given by people who came to the district before any village or street had been built. They named the place in their language, and that language may not now be spoken there.

FIG. 154.—BRITISH PLACE NAMES.

Let us look at some of the river names on the maps of Britain. There are two tributaries of the Severn, which are both called Avon. We have to distinguish them by speaking of one as the Warwick Avon and of the other as the Bristol Avon. There are still other rivers Avon in Britain. For example, there is one in Wiltshire, which flows past Salisbury, and another in the north-east of Scotland.

Nor is this the only river name which is repeated again and again in different parts of the country. In the north of England we have the Yorkshire Ouse, and we have the Great Ouse flowing into the Wash, and the Little Ouse into the Great Ouse. There is an Ouse also in Sussex.

Why is it that we find so many rivers called by the same name ? The reason is that in old times most people did not travel much, but passed all their lives in one small district. It was enough for them to say to their neighbours that they were going on " the river " when they went out in a boat, and it was not necessary for them to call the river by any special name, because every one knew what was meant.

Now some of these ancient people did not talk English, for they were British and spoke Celtic. To-day in the Celtic language of Wales the word for a river is " Avon," though it is spelt Afon. Welshmen do not talk of the River Towy, or the River Teifi, but they speak of Afon Towy and Afon Teifi.

The word "Ouse" means "water" in Celtic. When an ancient British farmer said he was going to drive his cattle to the water to drink, he would say that he was driving them to the Ouse. These names, Avon and Ouse, were given to English rivers by the Celts, before they were driven into Wales.

Most of the other river names of the British Isles are Celtic, but in the course of ages many of them have been changed, and are mispronounced by people who do not understand Celtic. Thus the name of the river Exe in Devonshire was once the same as Ouse, and meant simply "water."

The words Severn, Trent, and Thames have been so changed that we do not now know their meaning. We only know that they are names which have come down to us from Celtic times.

Now let us examine some town names. A few of them are Celtic. Inverness, for example, is Celtic, and means, as we have already learned, the town "at the mouth of the Ness." But these Celtic town names are mostly found in Scotland, Ireland, Wales, and Cornwall. There are not many of them in England. That is because the Angles and Saxons destroyed the Celtic villages, and drove the Celts into Scotland and Wales. In England, therefore, the names of the rivers and hills are far older than those of the villages and towns.

Some of the oldest town names in England come

down to us from the Romans, who conquered England, Wales, and the south of Scotland, but never conquered Ireland or the Highlands of Scotland.

The Romans held Britain by means of a Roman army and Roman governors, but the farmers and traders were still British. The Roman towns were fortified, and were connected by fine straight roads along which troops could march with ease. Therefore most of the names which have come down to us from the Romans are those of fortresses and roads.

Now the Latin word for a fort is "castra." This word, when pronounced by some of the early English, became "caster." We have it to-day in Doncaster, which means the fort by the river Don. But others of the English pronounced the word "chester." Chester is on the river Dee, and we find the word also in Manchester and Rochester.

Still others of the English pronounced the same word "cester," and so we find Worcester and Gloucester. And lastly, in the mouths of some people the word was reduced merely to "eter," and this is the form we have in Exeter.

If you go over the map of England you will be surprised to find how many places were once Roman forts. Their names contain the word "castra" in one form or other.

The Romans had to leave Britain when they had been here about four hundred years. Then

there came over the North Sea bands of pirates, who were called Angles and Saxons. They were heathen and very fierce men, who destroyed and killed all along our eastern and southern coasts. Leaving their ships, they marched inland, and burned and murdered. Gradually they subdued the whole country as far as the Tamar, and the edge of the Welsh Uplands, and the Scottish Highlands.

As their numbers increased, the whole character of the country changed. It has been Britain—the home, that is to say, of the Celtic Britons. It now became England—the land of the Angles, or Engles, or English.

The Angles and Saxons settled in villages, and gave their own names to them. Many villages and towns have names which end in "ham," like Wokingham. Now "ham" is shortened from "hame," which is another way of pronouncing "home," and Wokingham means the Home of the Wokings, a Saxon family who settled there. Other names end in "ton," as for instance Washington. "Ton" means "enclosure," and "town" is derived from it.. Washington means the town of the Washings, an English family.

The Angles and Saxons divided England into counties, and the names of some of these counties are very interesting. We have said that the pirates came first to the east and south coasts. The oldest counties are therefore in those parts of the country.

First of all we have Norfolk and Suffolk, which mean the North Folk and the South Folk. These were two allied peoples, who were Angle in race, not Saxon. Their joint country was known as East Anglia, because there were other Angles farther west and north.

Then we have Essex. Now the word Essex used to be written Essexe, and "Sexe" meant "Saxons," so that Essexe meant East Saxons. Middlesex of course means Middle Saxons, and Sussex means South Saxons.

Kent is a Celtic and not an Anglo-Saxon word. This is natural, because Kent was the first part of Britain to which foreigners came, and therefore its name was known on the Continent. It was a name which the Saxons knew before they came to England, and therefore they continued to use it.

What the word Surrey means no one really knows. The first part of it has something to do with South, but the meaning of the latter part has only been guessed at.

Farther west we have Hampshire, or Hants. We have already learned the meaning of the syllable "shire" (*p.* 60). Hampshire means the share of country which belongs to Southampton. This town used to be called merely Hampton, until it became necessary to distinguish it from Northampton.

West of Hampshire we find Wiltshire, Dorset, and Somerset. The old form of Wiltshire was Wiltset, and therefore we see that these three

Statute Miles
0 10 20 40 60
6 4 2 0 2
56
54
ARGYLL
PERTH
FIFE
St Andrews
Kirkcaldy
STIRLING
Edinburgh
Glasgow
RENFREW
LANARK
PEEBLES
BERWICK
Berwick
Holy I
Islay
Jura
Ayr
AYR
ROXBURGH
Jedburgh
Alnwick
NORTHUMBERLAND
DUMFRIES
Dumfries
KIRKCUDBRIGHT
WIGTOWN
Portrush
Stranraer
ANTRIM
Antrim
Larne
Belfast
DOWN
Downpatrick
ISLE OF MAN
Douglas
Peel
Ramsey
Carlisle
CUMBERLAND
Whitehaven
Barrow in Furness
Newcastle
N Shields & Tynemouth
S Shields
Gateshead
Sunderland
Durham
Hartlepool
Stockton
Middlesbrough
Whitby
Scarborough
WESTMORLAND
Darlington
Kendal
North Riding
Ripon
YORKSHIRE
Bridlington
York
East Riding
Hull
West Riding
Leeds
Bradford
Halifax
Huddersfield
Barnsley
Grimsby
Humber
Lincoln
Worksop
Doncaster
Gainsborough
Lindsey
Sheffield
Manchester
Stockport
Oldham
Bolton
Bury
Wigan
St Helens
Warrington
Macclesfield
Northwich
CHESHIRE
Liverpool
Birkenhead
Holyhead
Dublin
Drogheda
IRISH SEA
Preston
Blackpool
Southport
Blackburn
LANCASHIRE
Burnley
Ulverston
Lancaster
Morecambe Bay
Barrow
Derwent
Ouse
Swale
Tees
Tyne
Irthing
Solway Firth
Annan
Nith
Doon
Girvan
Campbeltown
Kilmarnock
Ayr
Arran
Bute
Greenock
Dumbarton
Clyde
Leith
Forth
Dunbar
Tweed
Drins
Teviot
Liffey
DUBLIN
Howth
Arklow
Wicklow
Carnarvon
Anglesea
Beaumaris
Flint
Rhyl
Conway
Bangor
Holyhead

FIG. 155.—ENGLAND, POLITICAL.

counties had similar names. At the end of each was the syllable "set," which you have in the word "settle," and in the word "seat." Wiltset, Dorset, and Somerset, were the districts of the Wilt Settlers, the Dor Settlers, and the Somer Settlers, three Saxon peoples who colonized this part of the country.

All through the Midlands the counties are called shires, and are named after their chief towns. So we have Oxfordshire and Warwickshire. Berkshire is an exception, for there is no town of Berk. What Berk signifies no one knows for certain. The little county of Rutland means "red land."

When the Angles and Saxons were firmly settled in England, and had been converted to Christianity, the fleets of yet other heathen pirates came across the North Sea. These were the Danes and the Norsemen. The Danes pushed up the navigable rivers in their boats, and in many parts formed Danish settlements, though they did not drive the Angles and Saxons out of the country, as the Celts had been driven out.

You may know these Danish settlements by their names. For example, when you see that a town has a name ending in "by," like Derby and Whitby, you know that it was founded by the Danes. Most of the names ending in "by" are along the east coast, or on the rivers which drain to the North Sea, because the Danes did not often settle in the west of the country. Nor did they

establish colonies on the Thames, so that Danish names are not frequent in the south-east.

The Norsemen, or Northmen, who came at the same time as the Danes, settled in the islands north and west of Scotland. Ships could easily cross from Norway by the Shetlands to the north of Scotland. From Denmark the Danes came most easily along the coasts of Germany and Holland to the east coast of England.

You may know the Norse settlements by their names. For instance, the Norse word for an island is "ey." So we have the Orkneys. The Norse name for the Hebrides was the Sudereys, which meant the South Islands, whereas the Orkneys and Shetlands were known as the Nordereys or North Islands. Sutherland was so called because it was a Norse colony to south of the Nordereys.

Last of all came the Normans, who were also Norsemen, but they had lived for several generations in France, in that part of the country which is called Normandy. Therefore they spoke French. The Normans very soon learned to speak English, so that there are not many places in England with French names. But there are a few. For example, in the New Forest there is a place called Beaulieu, which means in French "the beautiful place."

The Channel Islands belong to England and not to France, though French is their language. They lie off the coast of Normandy, and belonged

to the Normans. There are four of them, and they are called Jersey, Guernsey, Alderney, and Sark. Do you notice the curious fact that three of these names end in "ey," like the Orkneys. The reason is that when the Norsemen, or Normans, first came over the sea from Norway, they could not talk French, and in their own language they spoke of these islands as "eys."

Think of the villages, and towns, and rivers round your home, and see if any of them have names like those explained in this chapter. So you will know that long ago there came into your neighbourhood either Celts, or Romans, or Angles and Saxons, or Danes, or Norsemen, or Normans.

CHAPTER XXXVI. THE BEACON HILLS

To-day we travel easily from one part of the country to another. That was not always so. In the old days there were no railways and telegraphs. There were not even canals or good roads. Goods were taken on rough tracks by lumbering wagons, or were carried in bales on packhorses, or else they were transported by sea and river. Passengers travelled either on horseback or by boat.

Yet our forefathers were able to convey a simple message through the country in a few hours by means of beacons. That was how England learned that the Great Armada had been sighted in the Channel. At night a fire blazed on a hilltop, and was seen far away by watchmen on other hilltops. Each watchman had beside him a barrel of pitch, to which he set a light. So the news was spread eastward to London, and northward to the Scottish border, in order that the whole country might prepare for invasion.

Lord Macaulay wrote a poem about the Armada, in which he described how the beacons sent forward the message and roused England. Let us read it, and find on the map as many as we can

of the places which he mentions. We have already heard of most of them in previous chapters.

FIG. 156.—THE PLACES NAMED IN MACAULAY'S "ARMADA."

Night sank upon the dusky beach,
And on the purple sea,
Such night in England ne'er hath been
Nor e'er again shall be.

From Eddystone to Berwick bounds,
From Lynn to Milford Bay,
That time of slumber was as bright
And busy as the day ;
For swift to east and swift to west
The ghastly war-flame spread,
High on St. Michael's mount it shone,
It shone on Beachy Head.
Far on the deep the Spaniard saw
Along each southern shire,
Cape beyond cape, in endless range,
Those twinkling points of fire.
The fisher left his skiff to rock
On Tamar's glittering waves :
The rugged miners poured to war
From Mendip's sunless caves.
O'er Longleat's towers, o'er Cranbourne's oaks,
The fiery herald flew :
And roused the shepherds of Stonehenge,
The rangers of Beaulieu.
Right sharp and quick the bells all night
Rang out from Bristol town,
And e'er the day three hundred horse
Had met on Clifton Down.
The sentinel on Whitehall Gate
Looked forth into the night,
And saw o'erhanging Richmond Hill
The streak of blood-red light.
And eastward straight from wild Blackheath
The war-like errand went,
And roused in many an ancient hall
The gallant squires of Kent.
Southward from Surrey's pleasant hills
Flew those bright couriers forth ;
High on black Hampstead's swarthy moor
They started for the north ;

And on and on, without a pause,
Untired they bounded still;
All night from tower to tower they sprang,
They sprang from hill to hill;
Till the proud Peak unfurled the flag
O'er Darwin's rocky dales,
Till like volcanoes flared to heaven
The stormy hills of Wales;
Till twelve fair counties saw the blaze
On Malvern's lonely height,
Till streamed in crimson on the wind
The Wrekin's crest of light,
Till broad and fierce the star came forth
On Ely's stately fane,
And tower and hamlet rose in arms,
O'er all the boundless plain;
Till Belvoir's lordly terraces
The sign to Lincoln sent,
And Lincoln sped the message on
O'er the wide vale of Trent;
Till Skiddaw saw the fire that burned
On Gaunt's embattled pile
And the red glare on Skiddaw roused
The burghers of Carlisle.

There were many other Beacons besides those here mentioned by Macaulay. Many high hills still bear the name of beacon. For example we have Crowborough Beacon in Sussex, Inkpen Beacon where the counties of Berks, Hants, and Wilts meet, Dunkery Beacon in Somerset, and Brecknock Beacon in Wales. Have you any Beacon near you?

lington
Public
Libraries.

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FIG. 157.—A MODERN BRITISH SQUADRON AT SEA, WITH WIRELESS COMMUNICATIONS.

Fig. 158.—A Coach at Night.

CHAPTER XXXVII. THE RAILWAYS

The Romans made some fine roads through England for the movement of their troops, but the Angles and Saxons did not know how to repair these roads, and they gradually fell into decay. Thus it happened that for a very long time England had no roads fit for wheeled traffic. Even the Strand, the short road from London to Westminster, was a very bad road.

About two hundred years ago men began to make our present roads, so that people might drive across the country from town to town in carriages. One of the best of these road-makers was a man

called Macadam, and roads made according to his pattern are said to be macadamized.

About one hundred and fifty years ago men began to make canals, because goods are more cheaply moved in barges upon a canal than in

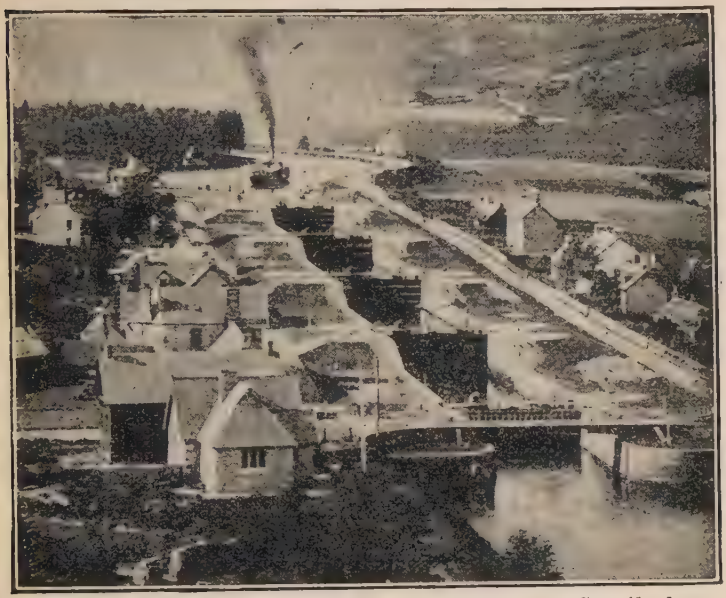

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FIG. 159.—A STAIR OF LOCKS ON THE CALEDONIAN CANAL.

wagons upon a road. The Bridgewater Canal was the first of the canals which were then made. It was constructed by the Duke of Bridgewater to bring coal into Manchester from a pit seven miles away.

With the increase of business, it became necessary to carry letters more quickly than before.

Therefore, a hundred years ago, four-horse coaches were employed to carry the mails along the roads. They travelled rapidly by day and night, the horses being changed every ten miles or so. Country towns were lively places then. Think of twenty or thirty coaches rattling through the streets every day with their horns blowing! They pulled up at the inns, and while the horses were being changed, the passengers dined, and then the journey was resumed. Some of the passengers changed coaches, just as we change trains.

Some ninety years ago men began to make railways. The first important railway was from Manchester to Liverpool. There are now over twenty thousand miles of railway in the British Isles. Measure how many times the railways of Britain would stretch from the Land's End to Cape Wrath. For two generations the railways carried all but the merely local traffic of the country; the roads were almost deserted by through traffic, and the country inns were neglected. But in the last twenty years, owing to the invention of the motor car, the roads are once more busy. The main roads are now being reconstructed—straightened, widened and hardened—to carry heavy and rapid vehicles.

The main lines of railway run out of London like the spokes of a great wheel. At the London end of each of these railways a station is marked in Fig. 146, p. 257. This station is called the terminus of the railway, because the line goes no

farther. The other terminus of most of the railways is somewhere on the coast. The word "terminus" is Latin, and means "end."

In this book the different parts of our country are shown upon contoured maps. Opposite to ten of these maps you will find railway maps. The contoured maps show you the shape of the country. Upon them you see the lie of the hills, the valleys, and the plains. The railway maps tell you how the railways go from town to town. If you compare each contoured map with the railway map opposite, you will see how the railways run round the hills, and along the valleys, and across the plains. Sometimes, however, a railway goes by a tunnel through a hill.

The railways of Great Britain are grouped into four systems, known as:

The Southern Railway (S.R.).

The London and North Eastern Railway (L.N.E.R.).

The London, Midland and Scottish Railway (L.M.S.R.).

The Great Western Railway (G.W.R.).

The Southern Railway consists of a number of lines south of the Thames; they radiate from London to the coast.

Two of these lines end at Dover. The one runs through Chatham, keeping to the north of the North Downs as far as Canterbury. The other passes under the North Downs in a tunnel, and then turns eastward to Folkestone and Dover, thus

10
8
6
4
2
0
2
58
56
Orkney Islands
C. Wrath
Pentland Firth
Caithness
The Minch
Northern Highlands
Moray Firth
St Kilda
Outer Hebrides
Moray
Buchan
Buchan Ness
Skye
Inverness
Grampian Highlands
Ardnamurchan Pt
ATLANTIC
OCEAN
Mull
Firth of Lorn
Strathmore
Firth of Tay
Fife
Firth of Forth
Central Lowlands
Islay
NORTH SEA
Mallin Hd
North Channel
Firth of Clyde
Southern Uplands
Cheviots
Tyne Gap
Dogger

FIG. 160.—BRITISH ISLES PHYSICAL.

keeping to the south of the Downs. The Chatham line crosses the river Medway at Rochester, and the river Stour at Canterbury. Then it runs up on to the Downs by a small valley, and down to Dover by another small valley. These lines carry many passengers for the Continent, because the steamers cross from Dover to Calais, or from Folkestone to Boulogne, in little more than an hour (Fig. 132, p. 232).

A third line runs to Lewes, and then through the South Downs to Newhaven. Steamers cross in three or four hours from Newhaven to Dieppe in France. This branch passes through the South Downs by the gap made by the Sussex Ouse.

The Brighton line is straight from London to Brighton. Express trains do the journey in an hour. They pass through two long tunnels, the one under the North Downs, and the other under the South Downs (Fig. 132, p. 232).

Another line runs to Portsmouth. Passengers go from Portsmouth to Ryde in the Isle of Wight by steamer across Spithead. The Portsmouth line does not pierce through the South Downs in a tunnel. There is a gap in the hills where the river Arun makes its way past the town of Arundel to the English Channel, and the Portsmouth railway goes through this gap.

The longest of the Southern lines runs from Waterloo Station to Exeter and Plymouth, by Woking, Basingstoke, and Salisbury. It goes round the north of Dartmoor, so that a ring of

railway surrounds that upland, since the G.W.R. skirts it to the south.

From Woking a branch passes through the North Downs by the gap at Guildford, and then by a tunnel through the South Downs to Portsmouth. At Basingstoke another branch strikes south-westward to Winchester, Southampton, Bournemouth, and Weymouth (Fig. 117, p. 207).

Of the LONDON AND NORTH EASTERN SYSTEM two lines run out of London into the Eastern counties. Liverpool Street Station is their terminus. The one passes through Colchester and Ipswich, and then divides to Norwich and Yarmouth. A short branch from this line ends at Harwich, whence steamers cross to the Hook of Holland. The other line runs from London to Cambridge, and then to Ely and Norwich. There are no long tunnels on these lines, because they traverse the plain of the east of England (Fig. 127, p. 225).

All the railways which leave the Metropolis in a north-westerly direction pass through the Chiltern Hills. They thread the little valleys which descend through the hills towards the Thames and the Lea. No fewer than five main lines of railway diverge north-westward from London. The reason is that most of our country lies in that direction, and all our largest towns (Fig. 153, p. 271).

The first of these five lines is the East Coast Railway from London to Scotland. It belongs to the London and North Eastern Company and runs from King's Cross Station in London

through Peterborough, Grantham, Doncaster, York, Northallerton, Darlington, Durham and Newcastle-on-Tyne to Berwick-on-Tweed, where it enters Scotland. Then it follows the coast to Edinburgh. It is four hundred miles long. You may travel from London to Edinburgh in a day, or in a night. As the map shows, the East Coast Route to Scotland is very level (Figs. 27, p. 44, and 52, p. 87).

There is an alternative line belonging to the same company as far northward as Northallerton. It leaves Liverpool Street Station in London and runs to Cambridge and Ely, as already described. Then it passes through Lincoln, crosses the main line at Doncaster, makes a loop to the west through Leeds and rejoins the main line at Northallerton. At Selby the Leeds and Hull straight line crosses the river Ouse. There are branches from York to Scarborough, and from Newcastle-on-Tyne to Carlisle. The York and Scarborough line passes between the Yorkshire Wolds and the North York Moors. The Newcastle and Carlisle line goes through the Tyne Gap in the Pennine Range (Fig. 27, p. 44).

In Scotland the L.N.E. Railway centres in Edinburgh. It sends out four main lines. They run to Berwick-on-Tweed, to Carlisle, to Glasgow, and to Dundee and Aberdeen. We have already spoken of the Berwick line. The line to Carlisle crosses the Southern Uplands of Scotland, at a height of nine hundred feet, and runs down the valley of

Gala Water to Galashiels. It then follows the Tweed and the Teviot to Hawick, and crosses the Cheviots at a height of a thousand feet. It is, therefore, a much more difficult line for trains than the East Coast route to Berwick and Newcastle.

The line to Glasgow through Falkirk is almost level. It crosses the narrowest part of the isthmus between the Firths of Clyde and Forth. The fourth line is very interesting. It is carried over the broad Firths of Forth and Tay by two of the grandest bridges in the world, and ends at Aberdeen the northernmost large city in the kingdom (Fig. 59, p. 104).

In England the L.N.E. Railway has a line across the country from Grimsby on the east coast through Sheffield to Manchester, and this is continued by the Cheshire Lines Railway from Manchester to Liverpool on the west coast. It goes through the Pennine Range in a long tunnel. A branch runs from Sheffield to Marylebone Station in London, thus giving a way for express trains from Manchester by Sheffield to Nottingham, Leicester and London.

Now let us start again from London. The London, Midland and Scottish Railway runs straight across England from Euston Station to Crewe. At Rugby it crosses the Warwick Avon, and there throws out a loop through Birmingham and Wolverhampton, which rejoins the main line at Stafford. Between Birmingham and Wolverhampton this loop traverses the Black Country.

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FIG. 161.—LONDON, MIDLAND AND SCOTTISH EXPRESS PICKING UP WATER.

There is another loop on the other side of the main line which goes through Northampton (Fig. 120, p. 214).

Crewe is a very important junction. There the lines separate which run north-eastward to Manchester, northward to Scotland, north-westward to Liverpool, and westward through Wales towards Ireland. The Liverpool line crosses the Mersey and the Manchester Ship Canal by Runcorn bridge. The famous railway from Manchester to Liverpool, which was built by George Stephenson and opened in 1830, belongs now to the L.M.S.

In Lancashire and the West Riding of Yorkshire the branches of the L.M.S. cover the populous manufacturing districts with a dense network of lines (Fig. 27, p. 44).

The Scottish line of the L.M.S. keeps to the west of the Pennine Range, and crosses the rivers Mersey, Ribble, and Lune. At Preston the northward trains join from Liverpool and Manchester. In the north of Lancashire a second engine is attached to some of the trains to help them up the long incline to the top of Shap Fell, which is a thousand feet high. Then follows a rapid run down from Shap into Carlisle (Fig. 27, p. 44).

Beyond Carlisle the railway enters Scotland. Once more the trains are pulled up from sea-level to a height of a thousand feet on Beattock Pass, where the Southern Uplands of Scotland are crossed. Another rapid descent follows along the valley of the Clyde into the Central Lowland of

Scotland. At Carstairs Junction the line forks to Edinburgh on the one hand and to Glasgow on the other.

The line to the North of Scotland diverges at Motherwell, between Carstairs and Glasgow, and runs through the gap in the hills at Stirling. Crossing the Forth, it turns north-eastward through Strathmore to Perth, where it crosses the Tay. It ends at Aberdeen. There are L.M.S. lines also from Glasgow to Edinburgh, and from Glasgow to the north. The latter joins the Motherwell and Aberdeen line a little south of Stirling (Fig. 59, p. 104).

Mountain railways branch into the Highlands from Glasgow, Stirling, Perth, and Aberdeen. They run through beautiful country but the population is small in that part of Scotland, and the trains are not frequent, except in holiday times.

The Irish branch of the L.M.S. diverges at Crewe and runs through Chester, and along the north coast of Wales to the Menai Strait. It crosses to Anglesea by a famous bridge, built by Robert Stephenson, the son of George Stephenson, and ends at Holyhead. Steamers ply from Holyhead to Kingstown, whence a short railway goes in to Dublin. There are also steamers direct from Holyhead to Dublin Harbour (Fig. 106, p. 192).

From Dublin three railways extend through Ireland—northward, westward, and southward. The GREAT NORTHERN OF IRELAND runs to Belfast,

with a branch to Londonderry. The remaining lines belong to the single system of the FREE STATE RAILWAYS. There are two main routes. The one runs to Galway, crossing the Shannon at Athlone, the other runs south-westward between the mountains of the east and west coasts to Limerick Junction, where it divides to Cork and Limerick. From Cork the line goes on to Queenstown in Cork Harbour, where some of the Atlantic steamers call on their voyage from Liverpool to New York. There are no great tunnels in Ireland, because the mountains stand in groups, round which the railways wind along the plains and valleys (Fig. 86, p. 152).

The MIDLAND SECTION OF THE L.M.S. is centred at Derby. One line runs south-westward from Derby through Birmingham to Bristol, where it connects with the G.W.R. to Exeter. Another line goes south-eastward through Leicester to London ; a third goes northward through Sheffield to Leeds ; and a fourth goes north-westward to Manchester.

From Leicester a direct line has been made through Nottingham to Leeds, thus avoiding Derby. From Leeds it passes through the Aire Gap in the Pennine Range to the Eden Valley and Carlisle. Thus the L.M.S. offers a third way from London to Scotland.

The L.M.S. is continued from Carlisle not only by the direct line to Glasgow, but also by a railway to Dumfries, which thus forms a triangle, the

points being at Dumfries, Kilmarnock and Stranraer. The Midland trains from London to Glasgow run by Dumfries and Kilmarnock, through Nithsdale. The other two sides of the triangle are formed by lines which converge along the south and west coasts upon Stranraer, whence steamers cross to Larne in Ireland. There is a short railway from Larne to Belfast. The Midland trains for Edinburgh are taken on from Carlisle by the L.N.E. Railway, through Hawick and Galashiels (Fig. 52, p. 87).

Once more we return to London. The GREAT WESTERN RAILWAY begins at Paddington Station. The main line follows the Thames valley, passing through the gap in the Chiltern Hills made by the river at Reading. At Didcot it divides. One branch strikes northward to Oxford and Birmingham, the other westward to Swindon. The Birmingham line continues through Wolverhampton and Shrewsbury to Chester, where it crosses the L.M.S., and ends at Birkenhead, opposite to Liverpool. There is a tunnel under the Mersey from Birkenhead to Liverpool. You may see on the map that this line, like the L.M.S., makes use of the lowland opening between the Derbyshire Peak and the Welsh Mountains (Fig. 120, p. 214).

From Swindon the G.W.R. extends on the one hand north-westward to Gloucester, and on the other hand westward to Bath and Bristol. The Gloucester line crosses the Severn, and then

follows the coast of South Wales, through Newport and Cardiff, to Milford Haven and Fishguard. There is a short branch to Swansea. From Fishguard steamers cross to Rosslare in Ireland, whence railways run northward through Wexford and Wicklow to Dublin, and westward through Waterford to Cork (Fig. 86, p. 152).

From Bristol the G.W.R. keeps to the west of the Mendip Hills for Bridgwater, Taunton, and Exeter. It continues round the south of Dartmoor to Plymouth, and across the Tamar Estuary by Saltash Bridge into Cornwall, where it ends at St. Ives and Penzance (Fig. 117, p. 207).

If you examine these G.W. lines upon the map, you will see that they avoid most of the hills by winding round them. A level railway is most cheaply built in this way. But the distances are, of course, much greater than by crow-fly. Of late years the traffic has increased, and therefore it has been worth while to build a number of short cuts through more difficult country (Fig. 153, p. 271).

On the G.W.R. there are three of these new direct lines. One runs from London to Birmingham straight across the Chiltern Hills, instead of through the Reading gap. It joins the old line at Banbury. A second short cut has been made from Swindon by a tunnel under the Cotswolds, and by a second tunnel under the Severn, to Newport in South Wales. This line saves the long northward bend through Gloucester. The tunnel under the

Severn is the longest in the British Isles. It is nearly four miles long (Fig. 106, p. 192).

The third short cut runs from Reading along the Kennet valley, and between the Mendips and Salisbury Plain, to Taunton, where it rejoins the old main line to Exeter and Plymouth. By avoiding the northward bend to Bristol, this line saves many miles between London and Taunton. There is a branch to Weymouth, whence steamers sail for the Channel Islands.

The railways from London northward and northwestward are known as the heavy lines, because they carry much coal. The lines southward and eastward are often called passenger lines, because their chief business is to carry travellers for the Continent and the watering places on the coast.

Much traffic is also carried by coasting steamers. Great quantities of coal are brought from Newcastle to London in this way. In an island merchants have often the choice of sending goods either by railway or by steamer.

Let us turn to each of the black and white maps which face the physical maps in this book. Trace the railways on tissue paper, and lay your tracing over the physical map. You will then see clearly how the railways wind round the hills and the estuaries, and at other places cross them by tunnels and bridges.

Fig. 162.—Canada.

CHAPTER XXXVIII. AREA

There is one other question which we must ask of the map before we close this book. You will remember that although Scotland is longer than Ireland, yet it does not contain quite as much ground, because of the firths of the sea which cut into the land. Clearly then it is not enough to measure the length of a country, but we must know how much space there is in it. Let us learn how to find this out.

In Fig. 162 we have in the centre a square mile on the scale of one mile to the $\frac{1}{4}$ inch. To the left we have another square on the same scale, but measuring two miles each way. You see at once that it has an area of four square miles. To the right we have yet another square, but drawn

on the scale of ten miles to the $\frac{1}{2}$ inch. Each side represents a length of ten miles, and therefore the square represents 100 square miles. Make a tracing of this square, and draw nine lines across from top to bottom with a sharp pencil, and nine lines from left to right. So you will divide it into 100 little squares.

Take a length of 100 miles as shown on the scale in the corner of one of the maps of the British Isles, and mark this off on the corner of a piece of paper. You can now tear off a neat square of paper, which will measure 100 miles

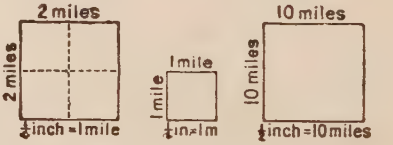

FIG. 163.—AREA.

each way according to the scale of the map. It will of course contain 100 times 100 square miles—that is to say, 10,000 square miles.

Lay this square upon the map by the side of Wales. You will see at once that if you allow for the bays, it is a little larger than Wales. This means, of course, that Wales measures a little less than 10,000 square miles.

Next lay the square over the north of Ireland, then over the centre, and then over the south. You will learn in this way that Ireland measures about 30,000 square miles, or three times the square of paper.

Do the same thing for Scotland, and you will see that Scotland also measures about 30,000 square miles. Ireland is a little larger than Scotland, but we are only making a rough measurement, and roughly they are equal.

Finally, place the square upon England, and try to make up your mind as to the size of that country. It is the largest of the four countries in the British Isles. If you judge rightly,

FIG. 164.—SOUTH AFRICA.

and if you then set down on paper the areas of Wales, Ireland, Scotland, and England, and add the numbers together, you will find out the area of the whole British Isles. It is about twelve times as large as the square of paper. What then is the area of the British Isles expressed in thousands of square miles ?

The British Isles are only a very small part of the world. There is about 430 times as much land on the round globe as there is in these islands.

If you multiply the sum out you can find how many square miles of land there are on the globe.

But the ocean covers a great deal more space than the land. It is *nearly* three times as large as all the land in the world. Therefore if you multiply the number of square miles of land by four, you will roughly ascertain the area of the surface of the globe.

If you work these sums correctly you will find that the surface of the globe measures about two hundred million (200,000,000) square miles.

Though the British Isles are so small, yet the British Empire is very large. In the maps of this chapter and the next we have five great parts of the British Empire drawn to the same scale as the British Isles. You see that the two islands of New Zealand are about as large as our own two islands, but that the British lands in Canada, Australia, India, and South Africa are very much larger.

FIG. 165.—INDIA.

Fig. 166.—Australia.

CHAPTER XXXIX. POPULATION

Every ten years the population of the British Isles is counted. We speak of this counting as the Census. The last census of Great Britain was taken in April, 1931; that of Ireland in 1926. The day before the census a paper is left in each house, and the head of the house has to fill it up, saying how many people slept there on the night of the census. The papers are collected next day, and the numbers are counted and added together. It takes several weeks to make the first count, and afterwards the numbers are re-counted in order to be sure there are no mistakes.

In 1931 there were nearly forty-nine million men, women and children in the British Isles, and

there were about 300,000 men away from Britain, serving in our navy, army and merchant ships.

More people are born each year than die, and therefore the population shows a tendency to grow in numbers from year to year. This increase, however, is gradually slowing down and at present applies to England only, so that when the numbers lost by emigration are taken into account, it appears probable that before very long the population of the British Isles will become stabilized at slightly over fifty millions.

There lived in England in the year 1931 nearly thirty-eight millions, or more than three-quarters of the population of the whole British Isles. In Wales there were less than two millions, in Scotland about four and three-quarter millions, and in Ireland about four and a quarter millions.

You see that the populations of Ireland and Scotland are nearly the same, but the population of Scotland is practically stationary, while that of Ireland is decreasing, because very many Irishmen emigrate and become colonists in new countries. There is little coal in Ireland, and the country is mainly agricultural. The population is decreasing in the agricultural districts of England and Scotland, but in many towns, particularly in the south of England it is growing rapidly. Since England and Scotland have many towns they together show an increase, notwithstanding the decrease in the rural districts.

Nearly eight millions and a quarter dwell in

London and its suburbs, or over one in every six of the people of these islands. There are four other cities, each of which, with its suburbs, has about one million people—Glasgow, Birmingham, Liverpool and Manchester. Three-quarters of all the people of Britain live in the towns, large and small, and only one-quarter on the farms and in the villages. Therefore it is very important indeed that the towns should be as healthy and beautiful as we can make them. But in many ways a country life is better than even the best life in a big town.

If all the people of Britain were scattered quite evenly over its surface there would be about 400 on each square mile. This you can easily find for yourself by dividing 49,000,000 by 120,000, which is the number of square miles in the British Isles. We express this by saying that the average density of population in the British Isles is 400 to the square mile. A crowd is dense when it is packed tightly together, but it is not so dense when it is more scattered. You should look in the dictionary for the meaning of the word "Average."

But the people are, of course, not evenly spread over the whole land. They are gathered together very closely in certain parts, while in others the population is very sparse. In the county of Sutherland, for instance, there are only about 16,000 people, although the county measures about 2,000 square miles. The density of population in Sutherland is therefore about eight to the square

mile. On the other hand, Lancashire, which has an area almost exactly the same as that of Sutherland, has a population of over five millions. You can find for yourself, therefore, that Lancashire has a density of population of about 2,500 to the square mile.

The densest population of all is in the county of London, which measures about 120 square miles. Nearly four and a half millions of people sleep within this space every night. Let us calculate the density of population in the County of London.

In the day time there are even more people in London, for a great many of those who are employed in the City and other central parts of the Metropolis, go out by tram or train in the evening to sleep in suburbs beyond the county boundary. You will remember that there are over eight million people in Greater London.

The people are crowded together in London because of the trade which is done there, and because the British Empire is ruled there. They are gathered together in Lancashire because of the manufactures carried on there. They are, however, scattered in Sutherland, because there is neither trade nor manufacture there, and very little agriculture, for the ground is chiefly highland.

Considered as a whole, the British Isles are a crowded country, although certain portions of them, like Sutherland, are sparsely peopled. But there is plenty of room in other parts of the

Empire. The whole of Canada, for example, has a population which is little larger than that of Greater London. Yet you may see in Fig. 162 how small are the British Isles when compared with Canada. There is much fertile soil in Canada, and there is coal. The reason for the sparsity of population is not, as in Sutherland, that the land is sterile, but merely that it has not yet been occupied.

Those who can find work to-day in Britain should stay here among their friends, but those who have not work should cross the ocean and make new homes for themselves in Canada, or Australia, or New Zealand, or South Africa. In all these lands they will remain the subjects of our King, George V; the same flag will be theirs, and they will not be among foreigners.

FIG. 167.—NEW ZEALAND AND THE BRITISH ISLES ON THE SAME SCALE.

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